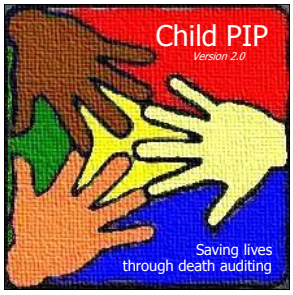

CHILD HEALTHCARE PROBLEM IDENTIFICATION PROGRAMME

Saving lives through death auditing

Saving Children: 2005

A survey of child healthcare in South Africa

Compiled by Child PIP Users and the MRC Unit for Maternal and Infant Health Care Strategies

Edited by ME Patrick and CR Stephen

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Foreword

Across the globe, concerns about the deteriorating state of the world's children are paralleled by concerns about their rights. Among these, the child's right to survival remains high on the unfinished agenda for promotion and protection of children's rights.

South Africa is widely acknowledged as having one of the most progressive constitutions in the world, with a special Bill of Rights for children. Alongside this provision for children, there are also well-developed, tried and tested means of preventing and treating the common causes of child deaths. Yet child mortality rates remain unacceptably high, with wide disparities between the rich and the poor, and between urban and rural communities. And in this setting, attainment of the rights to survival of all the country's children remains elusive.

The Saving Children 2005 report makes a valuable contribution to advancing the achievement of these rights. Describing child mortality in South Africa through a database of information from several sites in the country, it sketches a picture which not only characterises the extent of deaths, but also provides detail and texture of their causes and associations.

This comprehensive account of child mortality is complemented by a particularly useful road map of simple actions to be taken towards reducing child deaths.

Focusing on priority conditions such as HIV infection, the report recommends a range of health sector interventions - from high level policy, through education, to bedside clinical practice - related to this and other major causes of children's deaths in South Africa. The recommendations are simple, focused and detailed and with a pool of essential resources made available at each level of care, the goal of reducing the burden of child deaths in the country is attainable. As child health professionals, this report thus gives us a clear mandate for delivering interventions which are effective in addressing priorities identified by Child PIP, and which can have a lasting impact on child survival.

But we have a further responsibility - not only to heal and care, but also to act as advocates for this politically powerless constituency. Drawing the attention

of the broader health and development sectors, and the public at large, to the scourge of child deaths is a challenge to us as advocates for child rights and child survival. And Saving Children 2005 is a powerful advocacy tool which can be used from the level of community-based organisations, all the way to the portals of parliament.

I applaud the contributors to this report for providing a compelling story of child deaths in South Africa, and giving us the means to act.

Professor Marian Jacobs

Dean of the Faculty of Health Sciences
University of Cape Town

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Executive Summary

Introduction

This is the second "Saving Children" report, following the 2004 report. It presents the findings from 15 South African hospitals that used paediatric mortality auditing to assess the quality of child healthcare in South African hospitals. The hospitals used an auditing tool that was developed in South Africa, the Child Healthcare Problem Identification Programme (Child PIP).

Objectives

This study has several objectives, namely:

1. To collect demographic, social, nutrition, HIV and cause of death data on children who die in South African hospitals

1. To look for modifiable factors in the process of caring for these children prior to their deaths
2. To use this information to describe the children who died
3. To use the mortality review process to assess the quality of care received
4. To make recommendations for improvement based on the findings

Settings

Fifteen hospitals from six provinces of South Africa participated in the study. The sites represented different levels of paediatric healthcare serving rural, peri-urban and urban populations.

Methods

All sites used the Child Healthcare Problem Identification Programme to structure the mortality review process. Each site integrated collection of the data with their ongoing local audit process and used the data to compile a site report. Data from the 15 sites were also amalgamated into a single national database. An inter-observer variability study was conducted in 2006 to assess the level of agreement regarding assigned diagnosis.

Study Period

1 January 2005 to 31 December 2005.

Study Population

All children admitted to children's wards in the participating hospitals.

Findings

There were 20 891 admissions and 1 543 audited deaths, with 3 610 modifiable factors. The overall inpatient death rate was 6.8 per 100 admissions, and there were 2.3 modifiable factors per death. The health context of children who died was one of poverty, malnutrition and HIV, and the main causes of death were acute respiratory tract infection (including pneumocystis pneumonia), diarrhoeal disease, sepsis and tuberculosis. The inter-observer variability study indicated a very acceptable level of agreement for the 'All diagnosis' category for causes of death. Most deaths (56%) occurred in children under one year of age and 31% occurred during the first 24 hours after admission. Sixty percent of the children who died were malnourished. Half of the children who died were eligible for antiretroviral therapy on the basis of clinical HIV staging.

Modifiable factors occurred in the home, clinics, emergency and paediatric wards with the majority attributable to clinical personnel.

Recommendations

The 2005 Child PIP data highlights five key areas of importance, out of which this report's recommendations flow:

1) HIV/AIDS
   - Prevention: Reduce vertical transmission of HIV (PMTCT services).
   - Identification and Treatment: Give children and their parents ready and universal access to antiretroviral treatment (ART services).

2) Nutrition
   - At Clinic Level: Correctly identify, assess and manage underweight children, and refer earlier, if necessary.

- At Hospital Level: Provide emergency treatment and effective case management to children with severe malnutrition.

3) Gold Standards
   - At Clinic Level: Identify and manage sick correctly. The Integrated Management of Childhood Illness (IMCI) must be strengthened and sustained.
   - At Hospital Level: Adopt/develop and implement paediatric treatment guidelines and protocols systematically.

4) Norms to be Established and Implemented
   - Develop and implement staffing norms for the care and treatment of sick children. These norms must be sustained and appropriate, for each level of care.
   - Create and implement equipment norms by level of care in every institution caring for sick children.
   - Develop and/or implement transport norms for sick children.

5) Improving Paediatric Quality of Care
   - Paediatric mortality review and quality of care audits should take place in all institutions caring for sick children.

For each recommendation, corresponding implementation levels (policy, administration, clinical practice and education) and responsibilities are suggested in the report.

Acknowledgements

The Child PIP Group would like to thank the following, whose ongoing contributions to the paediatric mortality review process culminating in this report make a difference to the quality of child healthcare in South Africa:

- Professor Marian Jacobs, for her willingness to write the Foreword despite many other demands
- Latasha Treger and the Centers for Disease Control and Prevention, for ongoing support and funding
- Professor Bob Pattinson, for his vision, wisdom and support
- Mrs Roz Prinsloo, for her efficient and insightful organisation
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- Perlcom cc, for expert software programming and ongoing assistance
- The Child PIP Users, both those whose work appears in this report, and also current and future users

This report is dedicated to all the sick children in South Africa,
within and outside of the health system.

PART ONE:
THE CHILD HEALTHCARE SURVEY

Chapter 1

Paediatric Inpatient Mortality in South Africa: 2005

Introduction

In the fourth Millennium Development Goal all United Nations member states have pledged to reduce child mortality by two thirds in children under five years of age. The baseline year is 1990, and the goal should be reached by 2015.[1] Due to the devastating AIDS pandemic in sub-Saharan Africa this is unlikely to be achieved and child mortality is still rising.[2] For 2002, the infant mortality rate for South Africa (SA) was estimated at 59 per 1000 and the under-5 mortality rate at 100 per 1000.[3] Cause of death statistics in South Africa are still considered to be of poor quality.[4] Many children die at home and data on this for South Africa remain elusive.

Information on children who reach and then die in South African hospitals is scanty but began to emerge in the Saving Children 2004 report, the first survey in South Africa using the mortality review process to assess the quality of care that children receive in the health system.[5] [6] [7]

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[1] UNICEF. A world fit for children. UNICEF, Switzerland 2002.

[2] Bradshaw D, Bourne D, Nannan N. What are the leading causes of death among South African children? *MRC policy brief* 2003; 3: 1-4.

[3] Bradshaw D. Burden of Disease research. www.mrc.bod/AIDSindicators2005

[4] Bradshaw D, Nannan N, Groenewald P, Joubert J, Laubscher R et al. Provincial mortality in South Africa, 2000 – priority-setting for now and a benchmark for the future. *S Afr Med J* 2005; 95: 496-503.

[5] Child PIP group and MRC Research Unit for Maternal and Infant Healthcare Strategies. Saving Children 2004: A survey of child healthcare in South Africa. Pretoria 2005.

This is the second such survey in South Africa.

The Saving Children 2005 report gives an overview of child mortality in 15 South African hospitals where the mortality review process, using the Child Healthcare Problem Identification Programme (Child PIP), was used to ascertain the quality of care that children receive in the South African health system.

Child PIP provides the structure and tools for careful review of in-hospital childhood deaths by:

1. Ensuring all deaths are identified,
2. Determining the social, nutritional and HIV context of each child who dies,
3. Assigning a cause to each death, and
4. Determining modifiable factors in the caring process for each child who dies.

Health workers collect and analyse data at local level, but also send the information to a national database. Using this information, interventions at local, provincial and national level, can lead to improvements in quality of care and ultimately to a reduced in-hospital mortality rate for children.

Methods

Settings

Fifteen hospitals from six provinces of South Africa participated in the study. The sites represented different levels of paediatric healthcare serving rural, peri-urban and urban populations. The children's wards were either medical only or mixed medical and surgical.[8] Staffing levels and expertise varied widely.

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[6] Krug A, Pattinson RC, Power D. Saving Children: An audit system to assess Under-5 healthcare. *S Afr Med J* 2004; 94: 198-202.

[7] Krug A, Pattinson, RC, Power D. Why children die: An under-5 healthcare survey in Mafikeng region. *S Afr Med J* 2004; 94: 202-206.

[8] Children's wards in level one hospitals generally accommodate children with medical and surgical problems. In level two and three hospitals, children's wards are usually ether medical or surgical. No 'surgical only' wards participated in this study.

Table 1. Hospitals included in 2005 Child PIP data analysis

Province	*Hospital*	*Level of care provided*
Gauteng	Coronation	1-2 (with some 3)
Gauteng	Kalafong	1-3
Mpumalanga	Witbank	1-2 (with some 3)
North West	Gelukspan	1 (with some 2)
North West	Lehurutshe	1 (with some 2)
North West	Mafikeng	1 (with some 2)
North West	Thusong	1 (with some 2)
North West	Zeerust	1 (with some 2)
Kwazulu-Natal	Christ the King	1
KwaZulu-Natal	Edendale	1-2
KwaZulu-Natal	Grey's	2-3
KwaZulu-Natal	Mahatma Gandhi Memorial	1-2
Free State	Metsimaholo	1
Free State	National District	1
Northern Cape	Kimberley	1-2 (with some 3)

During 2005, Child PIP continued to expand to seven new sites and to all nine provinces of SA. The following sites submitted Child PIP reports, but their data were not included in this chapter because of initial software problems with data amalgamation and analysis: Bela-Bela Hospital (Limpopo), GJ Crookes Hospital (KwaZulu-Natal), Eben Donges Hospital (Western Cape), Dora Nginza Hospital (Eastern Cape) and Barberton Hospital (Mpumalanga).

Survey period

Participating sites conducted the mortality review process all or part of the period from 1 January to 31 December 2005. Duration of participation varied between sites from three months to the entire year.

Survey population

The survey population included infants and children from birth to 18 years of age that were admitted to children's wards and those dying either before or after arrival in casualty or outpatients in the participating hospitals.[9] The deaths of all infants and children from birth to 18 years of age were reviewed in detail.

Survey process

The data sources were the data capture sheets completed for each death and the monthly tally sheets that summarised ward statistics. The ongoing development and refinement of the Child PIP system

[9] Perinatal care and neonatal deaths are audited using the Perinatal Problem Identification Programme. See Saving Babies Reports of 2002, 2004.

during 2005 meant that, during the survey period, there were occasional changes in the way data were categorised and recorded.

Monthly tallies Monthly admission and death data from the wards were entered on the monthly tally sheet (Appendix B) and into the database. The monthly data were used to calculate inpatient mortality rates and crude case fatality rates (CFRs).

Mortality reviews For each death, a detailed one page data capture sheet was completed (Appendix B). This data capture sheet collects demographic, social, nutrition, HIV/AIDS, cause of death and modifiable factor data, as described below.

DEMOGRAPHICS Age, date and time of admission and death, and referral source data.

SOCIAL The parents' state of well-being, as well as the identification of the primary caregiver.

NUTRITION The nutritional status of the child, based on the Wellcome Classification.

HIV/AIDS Each death is classified for HIV status according to laboratory testing and clinical staging. The categorisation recorded in Child PIP reflects the while-alive status of the child, as it is this that impacts on clinical decision making. The clinical World Health Organisation (WHO) staging for children changed during 2005 from three to four stages. The categorisation process is explained in Appendix C.

Information on prevention of mother-to-child transmission of HIV (PMTCT), infant feeding during the first six months of life, PCP prophylaxis (cotrimoxazole use) and antiretroviral therapy (ART) for the child and mother have been added (the latter in 2005), and this data is sought for each death.

CAUSE OF DEATH Child PIP uses 59 ICD-10-based categories for cause of death. One 'main cause of death', up to four 'other important diagnoses' and one 'contributing condition' can be assigned per death. The 'main cause of death' is what primarily led to the death of the child. 'Other important diagnoses' are severe diseases that were present in the days before the child died. 'Underlying conditions' should include other health related

problems, which may or may not have had a causative link to the death.

A small study on inter-observer variability was conducted during 2006 and preliminary results indicated that a very acceptable level of agreement exists for cause of death data when combining 'main cause of death' and 'other important diagnoses' into an 'all diagnoses' category.

During 2005, AIDS was removed from the list as a cause of death, as was malnutrition as an underlying condition, because the HIV and nutritional status of *every* death are recorded on the current death data capture sheet. Pneumocystis jirovecii pneumonia (PCP) (suspected), PCP (confirmed), leukaemias, anaemia, homicide and suicide were added to the list of causes of deaths and cardiomyopathy and congenital heart disease were separated on the list. (Appendix D)

The Child PIP classification of deaths can be used in all hospitals, even where access to post-mortems and microbiological investigations are limited.

MODIFIABLE FACTORS

Child PIP provides a structure for identifying instances of substandard care and missed opportunities for intervention during the process of caring. These instances are known as modifiable factors and include events, actions or omissions contributing to the death or contributing to suboptimal care for a child who died and which, by means of locally achievable interventions, can be modified. For each modifiable factor, it is important to ask: "Where did it occur?" (home, PHC hospital) and: "Who was responsible?" (caregivers, administrative staff, clinical personnel).

The modifiable factor list in Child PIP was generated using the South African Standard Treatment Guidelines for primary healthcare and for paediatric hospital care, the Integrated Management of Childhood Illness guidelines, and South African national norms and standards for equipment in district hospitals as reference standards.[10] [11] [12] [13]

[10] The WHO and UNICEF: Integrated Management of Childhood Illness. Geneva 1997. South African generic adaptations (South African National Department of Health) 1999.

The categorisation of modifiable factors is explained in Chapter 2 and the list of modifiable factors is given in the Appendix D.

The mortality review process

Each hospital carried out a mortality review process in meetings or by individuals reviewing the folders of children who had died. Variations in the review process occurred because of differing staffing levels and local requirements.

Results

Baseline data

The monthly tally data indicated that there were 20 891 admissions, and 1 416 deaths. Not all sites were able to provide complete sets of monthly tally data, due to difficulties experienced with the ward admissions and discharges register. Difficulty was also experienced in compiling accurate tallies in hospitals where patients are transferred between different paediatric wards such as general, ICU and convalescent wards.

A total of 1 543 deaths were audited in detail, using the death data capture sheet. For these deaths, there were 3 610 modifiable factors.

Table 2. Summarised data from all sites for admissions, deaths, and modifiable factors

	2004 (<5 years only)	*2005 (0-18 years)*
Total admissions	19 695	20 891
Total deaths	1 532	1 416*
Case fatality rate (%)	7.8	6.8
Audited deaths	1 532	1 543*
Total modifiable factors	5 033	3 610
Modifiable factor rate (per death)	3.3	2.3

*Not all audited deaths were entered on the monthly tally sheets
Detailed baseline data from each site is recorded in Appendix A, Table A1

[11] South African National Department of Health. Standard Treatment Guidelines and Essential Drug List. Hospital Level Paediatric. EDP South Africa 1998. www.sadap.org.za/edl/paed

[12] South African National Department of Health. The primary healthcare package for South Africa: National norms and standards for district hospitals. Pretoria 2001.

[13] The WHO. Management of the child with a serious infection or severe malnutrition. WHO/FCH/00.1.Geneva 2000.

Information about children who died

Demographics

AGE Most children who died were under a year of age (56%), and there was a fairly equal gender distribution. (Appendix A, Table A2)

WHERE FROM Most children were referred from primary health clinics, and most came from inside the hospitals' drainage areas. Twelve percent were referred from the private sector. (Appendix A, Table A3)

HOW SOON THEY DIE Almost one-third of the children died within the first 24 hours in hospital. Twenty-six percent died during days 1-3 after admission. Eighteen percent died during days 4-7. Fourteen percent had stayed in hospital for more than 14 days before they died. (Appendix A, Table A4)

Social context

PRIMARY CAREGIVER In 58% of child deaths, the mother was the primary caregiver, and in 13%, a grandmother was the primary caregiver. The father was the primary caregiver in only 0.4% of cases, and information about the primary caregiver was unknown in 20% of the cases. (Appendix A, Table A5)

MOTHER'S WELLBEING In 7% of deaths the mother was dead, and in 9% she was sick. Information about the mother's wellbeing was unknown in 28% of the cases. (Appendix A, Table A5)

FATHER'S WELLBEING No information about the fathers' wellbeing was recorded in 75% of the cases. (Appendix A, Table A5)

Health context

NUTRITION Over 60% of children who died were underweight-for-age (UWFA) and 33% were severely malnourished. Seventeen percent of the cases had no record of the nutritional status. (Appendix A, Table A6)

HIV/AIDS Forty-six percent of children who died did not have a recorded laboratory assessment of their HIV status. The test was not indicated in only 3% of the cases. Eight percent of the deaths tested HIV-negative, 20% were HIV-exposed and 26% HIV-infected. Overall, 58% of the deaths were clinically staged for HIV and 50% of all deaths classified as Stage III or IV. (Appendix A, Table A8)

Of those infected or exposed, 17% were not clinically staged. Fourteen children with a negative test were staged. (Appendix A, Table A10)

PMTCT

In almost two-thirds of the deaths, there was no information on the child's experience of the PMTCT programme. Seven percent of the children received perinatal nevirapine but 19% did not receive any nevirapine. The mother was HIV-negative at delivery in 9% of cases. (Appendix A, Table A11)

FEEDING PRACTICE

There was no information on feeding practices in the first 6 months of life in 55% of the cases. Twenty-six percent of the infants were fed exclusively breast or formula, and 19% had mixed feeding. (Appendix A, Table A12)

PCP PROPHYLAXIS

By laboratory status (exposed or infected), 46%, and by clinical category (Stage I-IV), 58% of children who died were eligible for PCP prophylaxis using cotrimoxazole (Table A8). Only 14% were receiving cotrimoxazole at the time of their admission. (Appendix A, Table A13)

Of those children dying with suspected or confirmed PCP, 19% received cotrimoxazole prophylaxis. (Appendix A, Table A14)

ANTIRETROVIRAL THERAPY

Based on their clinical stage, 50% of children who died were eligible for antiretroviral therapy (ART). Only 3% of children who died were documented as being on ART at the time of admission. Only 1% of mothers were on ART, but in the vast majority (77%) no information was available on their ART usage. (Appendix A, Table A15)

Inpatient mortality

CASE FATALITY RATES

The overall case fatality rate (CFR), or inpatient mortality rate, for the 15 sites was 6.8 deaths per 100 admissions, with the highest rate in the 1-12 month age group (10.5). The CFR for malnourished children was much higher (14.5 per 100 admissions) than for children with weight above the 3rd Centile (4.6). There were no meaningful CFR's for acute respiratory infections (ARIs) and diarrhoeal disease (DD). (Appendix A, Table A16)

Causes of child deaths

CAUSES OF DEATH

The main and other associated causes of death identified in the mortality review are listed in Appendix A, Table A17.

The leading causes of death for all children were ARIs, septicaemia, DD, PCP and TB as shown in Table 3.

Table 3: Top 5 causes of death (all diagnoses)

Diagnosis	*2005 (number)*	*2005 (%)*
Pneumonia/ARI	498	18.0
Septicaemia	357	12.9
Acute diarrhoea	315	11.4
PCP (suspected or confirmed)	239	8.6
TB: pulmonary/extrapulmonary	226	8.2

Comparative data for 2004 was only available for the main cause of death in the under-5 age group and is shown, with the 2005 data, in Table 4.

Table 4: Main cause of death (1 month-5 years)

Diagnosis	*2004 (no.)*	*2004 (%)*	*2005 (no.)*	*2005 (%)*
Pneumonia/ARI	501	32.7	236	21.5
Septicaemia	186	12.1	185	16.9
Acute diarrhoea	226	14.8	168	15.3
AIDS	158	10.3	-	-
PCP (suspected or confirmed)	-	-	120	10.9
TB: pulmonary/extrapulmonary	41	2.7	54	4.9
Chronic diarrhoea	65	4.2	57	5.2
Bacterial meningitis	62	4.0	44	4.0
Other causes	224	14.6	207	18.9
Unknown cause/No data	69	4.5	25	2.3
Total	1532	100	1096	100

UNDERLYING CONDITIONS

Specific underlying conditions were identified in 6% of the deaths, with ex-low birth weight/prematurity accounting for half of these (3.1%) and birth defects one-quarter (1.4%). (Appendix A, Table A18)

Information about quality of child healthcare

Records

Fifty-eight percent of the records were incomplete, inadequate or missing. Forty-two percent of the records were complete and the clinical recording was adequate, as shown in Table 5.

Table 5: Quality of Records

	Number	*Percent*
Folder not available	113	7.3
Folder available: incomplete and/or inadequate	591	38.3
Folder available: OK	647	41.9
Unknown	192	12.4
Total	1543	100

Modifiable factors

There were 3 610 modifiable factors in the 1 543 deaths. The overall modifiable factor rate was 234 per hundred deaths. For each child who died there were on average more than two occurrences of substandard care.

WHERE DO THEY OCCUR AND WHO IS RESPONSIBLE?

Seventy-eight percent of modifiable factors occurred within the health system, and 22% at home. Most modifiable factors were identified in hospital, both during admission/emergency and in the ward. (Table 6)

A total of 1 891 clinical personnel modifiable factors was reported (123 per 100 deaths). Thus, for each death there was more than one instance of substandard/modifiable care attributable to clinical personnel. A total 807 administrative modifiable factors were identified in the 1 543 deaths resulting in a rate of 52 per 100 deaths. (Table 6)

Table 6: 'Where' and 'Who' of Modifiable factors (MFs)

Where they occur	***Number***	***Proportion of MFs(%)***
Home	775	21.5
Primary health clinic	536	14.8
Admission & Emergency care	981	27.2
Ward	919	25.5
Other	399	10.9
Total	3610	100
Who is responsible	***Number***	***Rate (per 100 deaths)***
Caregiver and family	908	59
Administrator	807	52
Clinical personnel	1891	123
Total	3606	234

In the home and community

CAREGIVER AND FAMILY

The most common modifiable factors included "delay in seeking care" (30%) and "not realizing the severity of illness" (16%). Fourteen percent of modifiable factors at home related to inappropriate nutrition. Declining HIV testing accounted for 8% of caregiver-related modifiable factors. (Appendix A, Table A19)

At the primary healthcare interface: clinics and ambulatory care

CLINICAL PERSONNEL

The top 5 …

- IMCI not used for patient assessment (11%)

- Delay in referring failure to thrive (10%)
- IMCI not used for case management (9%)
- Insufficient assessment for failure to thrive (8%)
- Other insufficient assessment (6%)

The majority of modifiable factors listed at the primary healthcare level are based on the IMCI guidelines. Hence almost 80% of those recorded showed a failure to successfully implement the IMCI programme. Four percent related to poor TB management.

ADMINISTRATORS

The top 3…

- Lack of drugs and intravenous (IV) fluids (6%)
- Lack of high care beds and resuscitation area (5%)
- Lack of access to the clinic and limited clinic opening times (2%)

Administrator-related modifiable factors accounted for 22% of all those recorded at primary healthcare level and the majority reflected barriers to accessing care and a lack of consumables such as drugs and IV fluids.

(Appendix A, Table A20)

During admission and emergency care: Casualty and Outpatients

CLINICAL PERSONNEL

The top 5…

- Appropriate antibiotics not prescribed (12%)
- Appropriate investigations not done (6%)
- Insufficient case management (5%)
- Physical examination incomplete (4%)
- Oxygen saturation not monitored (4%)

Nearly two-thirds of the modifiable factors recorded in casualty and outpatients related to clinical personnel, and most were due to insufficient case assessment and management.

ADMINISTRATORS The top 3…

- Lack of hospital beds and overcrowded wards (11%)
- Lack of senior doctors (6%)
- Lack of infant/paediatric intensive care units (ICUs) (5%)

Most of the modifiable factors related to administrators at this level described inadequate access to health services due to inadequate facilities and a lack of personnel.

(Appendix A, Table A21)

In the wards

CLINICAL PERSONNEL The top 5…

- Blood glucose not monitored (8%)
- Inappropriate antibiotic and/or TB treatment prescribed (6%)
- IV fluids incorrectly prescribed (6%)
- Insufficient case assessment (4%)
- Appropriate investigations not done (4%)

Three-quarters of the modifiable factors occurring in wards related to clinical personnel. Insufficient monitoring and inadequate case assessment accounted for the majority of modifiable factors. However problems with case management in general, and the management of IV fluids in particular, accounted for the remainder.

ADMINISTRATORS The top 3…

- Lack of professional nurses (13%)
- Doctor not called for critically ill child (2%)
- Insufficient pulse oxymeters (2%)

Of particular note is that sixty percent of the administrator-related modifiable factors described a lack of personnel, and this almost entirely related to a lack of professional nurses.

(Appendix A, Table A22)

Avoidable deaths?

When finally reviewing each death the following question was asked:

'In your opinion, had the process of caring been different, would this death have been avoidable?'

There were responses for 322 deaths in which 146 (45%) were considered to have been avoidable, 39 (12%) were considered unavoidable and in 68 (21%) the assessor was not sure. (Appendix A, Table A23)

Discussion

During 2005, Child PIP's system and software continued to develop and expand in conjunction with increasing participation by hospitals. Audit meetings were held in all participating hospitals. The frequency of these meetings varied (daily, weekly or monthly) according to workload, number of deaths and staffing. Professional nurses in paediatric wards, who play a key role in healthcare delivery for sick children, were mostly not involved in the Child PIP process and audit meetings but they played a pivotal role in one or two sites.

The significance of the information about children who die

Demographics

AGE The 2005 findings proved that younger infants have a higher risk of dying. Training and protocols must focus on competencies to assess and treat the youngest.

WHERE FROM Most children dying in hospital had initially been seen at primary health clinics and then referred to hospitals in the appropriate drainage area. Thus ensuring a high standard of first line care for children at clinics is important for their survival.

HOW SOON CHILDREN DIE As found in the 2004 survey, one-third of the children died within the first 24 hours in hospital. This suggests that there are problems with

the entire pre-admission chain of care including late presentation, suboptimal management at the point of entry into the health system and in the transportation of sick children.

On the other hand, 14% of the children had stayed in hospital for more than 14 days before they died. This increased from 7% in 2004, and may reflect more severe and/or chronic illness in children admitted to hospital. It may also reflect a shortage of hospice-type beds for children dying with HIV and AIDS.

Longer hospital stay also contributes to overcrowding in paediatric wards which will in turn exacerbate problems with quality of child healthcare.

Social context

PRIMARY CAREGIVER AND PARENTS' STATE OF HEALTH

Over a quarter of the children who died, and for whom there is caregiver information, were not cared for by their mother, and of these almost 60% were cared for by their grandmother. Although this data may be a consequence of a broader social problem created by the increased numbers of orphans as a result of the HIV pandemic, it is more likely to reflect that children without mothers as their primary caregiver are at greater risk of dying. Either way, it represents a significant social problem which requires further investigation.

Health context

NUTRITION

The overall assessment of a sick child and the prescription of feeds and medication are fundamentally related to the child's weight. In 17% of child deaths, the weight was not known, compared to 10% in 2004. (Appendix A, Table A6) This implies serious problems in the most basic assessment of sick children. It is a cause for great concern that increasing numbers of sick children in hospital are unweighed.

Sixty-one percent of children who died were underweight and of these, 55% had severe malnutrition. Deaths of children with severe malnutrition are the tip of an iceberg that represents the malnutrition epidemic in South Africa. Undernutrition is the most common underlying problem in child deaths associated with infectious diseases

worldwide. Being underweight increases the case fatality rate for infectious diseases markedly, more than doubling the risk of dying.[14]

Despite the existence of good specific clinical protocols for severe malnutrition[15], there were many instances of substandard care relating to basic management and monitoring, such as fluid therapy, food prescriptions and blood sugar monitoring.

Only 12% of the underweight children who were tested for HIV were negative. Only 4% of the tested children with marasmus were HIV-negative (Appendix A, Table A7). This demonstrates the tremendous overlap of HIV infection and severe malnutrition in South African children. Improved feeding and poverty alleviation to improve food security must go hand in hand with ART access for HIV-positive children with severe malnutrition.

HIV/AIDS

Situated at the centre of the global HIV pandemic, it is universally acknowledged that HIV and AIDS is the most serious health challenge facing South Africa.

Therefore, the basic management of a sick child in South Africa includes a meticulous HIV assessment. This assessment consists of an HIV laboratory test (which, depending on the age of the child and the nature of the test, leads the healthworker to categorise the child as negative, exposed or infected), and clinical staging based on the South Africa adaptation of the WHO clinical staging guideline.[16] The findings on both testing and staging were alarming and again indicate major problems with the quality of care that children receive in South African hospitals.

Results of the 2004 report showed that 59% of under-5 deaths were HIV-related and AIDS-related. In 2005, 46% of all deaths were known to be HIV-related and in a further 46% the HIV laboratory status was not known. (Appendix A, Table 8) Only 8% of children

[14] Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year? *Lancet* 2003; 361: 1-10.

[15] The inpatient management of severe malnutrition: Eastern Cape, KZN, adapted from WHO

[16] South African National Department of Health (Khomanani). Guidelines for the management of HIV-infected children. First Edition 2005.

who died tested negative. (Table A9 in Appendix A gives more detail of HIV laboratory status in different age groups).

HIV TESTING

Table A8 in Appendix A shows that in 46% of deaths the child was not tested for HIV. In the face of this, appropriate care plans for children (both sick and well) can only be made if they are properly assessed for HIV, which includes laboratory testing and clinical staging. The low testing rate in the sickest children (those who die) is therefore a cause for great concern. Lack of testing is also a serious barrier to accessing holistic HIV care.

HIV STAGING

Forty-two percent of all children who died were not clinically staged for HIV. Eligibility criteria for accessing ART include children with clinical Stage III or IV HIV disease irrespective of their CD4 count. Failure to stage children denies them an access point to ART. Fifty percent of the children who died were stage III or IV and thus qualified for ART. The number of children eligible for ART dying in South African hospitals is substantial.

After laboratory testing all exposed and infected children must be staged. Where ART is indicated by CD4 counts or clinical staging, children must be immediately and appropriately managed.

The reason for lack of implementation of these basic measures has not been established in this audit, but it is worrying that health workers, located at the centre of the global pandemic, are unable or unwilling to properly assess childrens' HIV status. Factors that may contribute to this apathy include:

- Lack of emphasis in undergraduate training on the importance of clinical staging
- Staffing deficiencies in all categories of health workers
- Overcrowding of children's wards
- Lack of capacity in hospital laboratory services

PMTCT, FEEDING AND PCP PROPHYLAXIS

The Child PIP 2005 data provide new and important detail on HIV prevention and treatment strategies. There are serious problems with

PMTCT, including feeding choices and PCP prophylaxis, and with ART access.

In all child deaths, only 19% of mothers did not get PMTCT prophylaxis (nevirapine) but PMTCT information was not provided in two-thirds of the cases. Nineteen percent of under-5 deaths had been on mixed feeding but in 55% information about infant feeding was lacking. Only 19% of children dying with PCP had been on cotrimoxazole prophylaxis.

The information provided by Child PIP should lead to rapid and effective responses to strengthen PMTCT programmes and PCP prophylaxis for all eligible mothers and children. PCR testing of infants is being implemented in all provinces in South Africa and will help to identify infected infants for necessary follow-up. Treatment for HIV-infected mothers and children and strategies to prevent HIV infection in young adults must be urgently strengthened. Both the coverage and delivery strategies for interventions to combat the HIV pandemic in South Africa should be reviewed and weaknesses corrected.[17] The PMTCT programme consists of seven successive steps. Even if each of them had 80% coverage, the end result would only be a 21% coverage for mothers and infants at risk. If PMTCT with single dose nevirapine has an efficacy of 60%, then the vertical transmission would only drop from 33% to 29%.

Universal coverage of PMTCT implies that the programme has to reach 98-99% coverage for all women attending antenatal care. This may seem utopian, but less will not work. The Good Start Study in Chapter 7 of this report shows that safe infant feeding plays the major role in maintaining the HIV-negative status in infants during the first year of life. Most mothers will need regular support and counselling to implement and sustain safe infant feeding choices.

ANTIRETROVIRAL THERAPY

Whereas 50% of deaths in this report were eligible for ART (on clinical staging), only 3% of the total deaths were documented to have received treatment. Some hospitals have substantial numbers of children on ART, but overall deaths in HIV-infected children have not declined.

[17] Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS. How many child deaths can we prevent this year? *Lancet* 2003; 362: 11-17.

Access to paediatric ART and PMTCT coverage are not satisfactory. It is estimated that even adult ART services only reach 10% of the patients who need them.[18] Even in centres that effectively implement PMTCT and paediatric ART programmes, many sick children come in from surrounding areas where services are less effective. However, scale-up of HIV services may actually accentuate inequalities in healthcare in South Africa.[19] Rich people can access new interventions more easily than poor people.[20]

Inpatient mortality

CASE FATALITY RATES

The overall case fatality rate (CFR) for all child deaths for the 15 sites was 6.8 deaths per 100 admissions. The rates differed markedly between the study hospitals, from 3.1 at National District Hospital to 9.9 at Grey's Hospital (Appendix A, Table A1). However, patient populations, referral/admission criteria and referral levels must be considered when comparing CFRs between different hospitals. Other influencing factors include the local HIV prevalence, quality and coverage of the PMTCT programme (including cotrimoxazole prophylaxis), access to ART and poverty levels. The strength of Child PIP is clear when monitoring one institution over time.

The under-5 case fatality rates of the following hospitals using Child PIP have decreased from 2004 to 2005: Grey's, Edendale and Kimberley, as well as Witbank and Thusong (see the relevant site reports in Part 4). This is a positive development, especially as the children who were admitted in 2005 appear to have been sicker than in 2004. The CFR for Lehurutshe was unchanged. For Metsimaholo, Kalafong, Zeerust, Gelukspan and Mafikeng Provincial the under-5 CFRs have increased (Appendix A, Table A1). Several factors may account for this increase: the progression of the HIV pandemic, especially where paediatric ART services are not well staffed and developed, and widespread severe staff shortages in paediatric care.

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[18] Lawn S D, Wood R. Tuberculosis control in South Africa – will HAART help? *S Afr Med J* 2006; 96: 502-504.

[19] Scott V E, Chopra M, Conrad L, Ntuli A. How equitable is the scaling up of HIV service provision in South Africa? *S Afr Med J* 2005; 95: 109-113.

[20] Victora C G, Wagstaff A, Armstrong Schellenberg J, Gwatkin D, Claeson M, Habicht J P. Applying and equity lens to child health and mortality: more of the same is not enough. *Lancet* 2003; 362: 24-32.

Staffing levels and case fatality rates in this survey show wide discrepancies between different institutions and further analysis is needed to understand how they relate to one another. Major inequities in child healthcare should be identified and addressed. The growing HIV pandemic makes additional human and other resources for paediatric inpatient care an urgent necessity.

Comparing data between hospitals is only valid when the hospitals are similar in terms of level of care offered and type of population served. Once data has been verified and similar hospitals grouped, reviewing and comparing hospitals with high and low case fatality rates can be useful. Hospitals with low case fatality rates for a particular disease may have appropriate staffing and 'presumed best practice'. Comparisons can then be made between the protocols and organisation of the 'presumed best practice' hospitals and other hospitals. This process may facilitate improvement of protocols and staffing, particularly at hospitals with high CFRs.

Causes of child deaths

CAUSES OF DEATH

The pattern of disease causing child deaths as described in this report is similar to those experienced in other sub-Saharan African countries. (Table 3) Many of these deaths that occur in developing countries are preventable.

Table 4 summarizes the most common main causes of under-5 deaths in this survey, and compares 2004 and 2005 data. PCP is a new category in the 2005 data and is a very common cause of death (11%). Information about PMTCT and cotrimoxazole coverage was seriously lacking in these deaths but where information was available it showed that these programmes need to be urgently improved (Appendix A, Tables A13 & A14). The other common causes of death in both 2004 and 2005 included ARIs, sepsis and gastroenteritis. AIDS has been removed as cause of death, as explained under methods.

TB has increased as a main cause of death from 2.7% in 2004 to 4.9% in 2005, although for all diagnoses it accounts for 8.2%. This may reflect problems in adult TB management as well as a lack of contact tracing and treatment. The increase in TB incidence rates in South

Africa has been described in Kharsany et.al..[21] TB services in Africa are under funded and understaffed.[22]

Sepsis has become more common and is often the terminal event in HIV-infected children. Infants with sepsis may present with diarrhoea and vomiting and may be incorrectly classified and treated for dehydration only. The co-occurrence of two or more infectious diseases (for example ARI, gastroenteritis and septicaemia) is common in malnourished and/or HIV-infected children. This comorbidity may result in synergism, leading to an increased risk of death.[14]

Acute respiratory infections are a leading cause of death in children in developing countries.[23] [24] [25] It is estimated that 21% of all under-5 deaths in 2000 were attributed to ARI, and half of these deaths were associated with undernutrition.[14]

Improved case management for common conditions such as ARI, sepsis, PCP, gastroenteritis and TB, which make up almost two-thirds of child deaths, could improve outcomes considerably. Many hospitals already have protocols for these common conditions. Possible obstacles to the implementation of such protocols need to be explored, as well as the impact of local working conditions for clinical personnel on the implementation of improved case management.

Only 1% of children died due to hospital-acquired infections (Appendix A, Table A17). However, this problem may have been under-reported and hospital-acquired infections may be on the increase, especially for immunocompromised patients, during long hospital stays and in overcrowded sites. Site reports show that in some hospitals up to 6% of deaths were due to hospital-acquired infections.

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[21] Kharsany A B M, Connolly C, Olowolagba A, Abdool Karim S S, Abdool Karim Q. Increasing burden of pulmonary tuberculosis in young women. *S Afr Med J* 2006; 96: 524-525.

[22] Corbett E L, Marston B, Churchyard G J, De Cock K M. Tuberculosis in sub-Saharan Africa: opportunities, challenges and change in the era of antiretroviral treatment. *Lancet* 2006; 367: 926-937.

[23] Eichenwald HF, Mulholland K, Margolis P, Gove S, McCaul F, Parker S et al. Etiology and clinical signs of serious infections in young infants in developing countries: a WHO collaborative study. *Ped inf dis J* 1999; 18: S1-S69.

[24] Reyes H, Perez-Cuevas R, Salmeron J, Tome P, Guiscafre H, Gutierrez G. Infant mortality due to acute respiratory infections: the influence of primary care processes. Health Policy Plan 1997; 12: 214-223.

[25] Duke T, Michael A, Mgone J, Frank D, Wal T, Sehuko R. Etiology of child mortality in Goroka, Papua New Guinea: a prospective two-year study. Bull Wld Hlth Org 2002; 80: 16-25.

Congenital abnormalities were mentioned in only 0.3% of cases as a cause of death. These conditions may have been underestimated in this report, as most hospitals do not have access to post-mortems and paediatricians did not assess more than half of the cases.

Trauma deaths in childhood are not captured in this survey. Only 17 surgical deaths, 11 other accidents/bites/poisoning deaths, 8 abuse-related deaths and 7 burns were recorded. This is because currently only paediatric medical wards use Child PIP. In district hospitals, paediatric wards have both medical and surgical patients. Surgical and trauma patients are usually referred to regional or provincial hospitals early, if their condition is critical. However, Child PIP is hoping to expand to more fully cover surgical causes of death, and surgeons are being encouraged to implement the programme.

The significance of information about quality of child healthcare

Problems in the health system

The Child PIP audit helps managers and health workers identify gaps in healthcare delivery. The knowledge and understanding gained by this analysis of child deaths must be translated into action.[20] [26] Barriers and constraints in the implementation of child survival interventions should be identified and overcome. It is known globally that weak health systems and inequitable distribution of effective interventions lead to poor coverage and ineffectiveness.[27] [28]

Record keeping

LACK OF INFORMATION

Seven percent of files were missing and only 42% of records were complete and included adequate clinical notes and information on pre-hospital care (Table 5). This is a cause for concern as it is a basic principle of clinical care that children can only be looked after properly if the clinical records are satisfactory.

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[26] The Bellagio Study Group on Child Survival. Knowledge into action for child survival. *Lancet* 2003; 362: 33-38.

[27] Bryce J, Arifee S, Pariyo G, Lanata CF, Gwatkin D, Habicht J. Reducing child mortality: can public health deliver? *Lancet* 2003; 362: 18-24.

[28] Darmstadt G L, Bhutta Z A, Cousens S, Adam T, Walker N, De Bernis L et al. Evidence-based, cost-effective interventions: how many newborn babies can we save? *Lancet* 2005; 365: 977-988.

The lack of Road-to-Health Charts (RTHCs) in audit meetings and poor quality of clinical notes were in themselves markers of problems with quality of care. When assessing for the presence of modifiable factors, the guiding principle used was "if it is not written down, it was not done". Continued use of Child PIP as an assessment tool will show whether regular feedback from audit meetings is sufficient to improve record keeping, or if other interventions are needed. The fact that all deaths are audited should be an encouragement for clinical personnel to improve record keeping.

Another important, and often difficult, aspect of record keeping was the collection of basic ward statistics for all admissions (and discharges) from which denominators for CFRs are calculated. For accurate collection of this data, a standard ward register should be used (see Appendix E). It is vital that information be gathered with due regard for accuracy by all health workers, from ward clerks to hospital managers.

Modifiable factors: Where and Who?

HOME AND COMMUNITY

The frequency of caregiver-related modifiable factors differed widely between different sites as between 7% and 82% of all modifiable factors identified were related to factors in the child's home. (Appendix A, Table A1)

The most significant problems were delays in seeking care and caregivers not realising the severity of their child's illness. In this regard, although the IMCI community component has not yet been widely implemented in South Africa, it has the potential to impact positively on appropriate home management and care-seeking behaviour, for example by teaching danger signs to caregivers. However, as the HIV pandemic progresses, the degree of poverty increases and an increasing number of children may not have caregivers able to take them to a health facility. Thus, family-related modifiable factors may reflect not only health-seeking behaviour but also the major socioeconomic needs of children in South Africa.

PRIMARY HEALTHCARE (PHC)

Although information on primary healthcare was incomplete, it was obvious that IMCI coverage and implementation are still inadequate. Many deaths could be averted by higher IMCI coverage with effective and consistent implementation. Child mortality will not drop if

interventions are provided in a patchy and uncoordinated manner. The IMCI community component, improved care at PHC level and at level one referral hospitals should be delivered as a package, so that improved care-seeking behaviour is met by improved quality of care provided by clinical personnel.[27]

PHC, transport and care-seeking behaviour should be further analysed and analysis should especially focus on children who die during the first 24 hours in hospital (31% of all deaths). Multiple and severe infections in young infants, as documented in this report, must be treated and referred early to achieve better outcomes. Improved outcomes require adequate resources and cooperation at family and PHC level.

HOSPITAL: ADMISSION & EMERGENCY AND WARDS

The care of sick children once they get to hospital is an area of great concern. On thorough review of the Child PIP data, problems were identified in the case management of five key conditions: ARI, sepsis, PCP, gastroenteritis and TB. As these conditions cause almost two thirds of child deaths, the implementation of appropriate protocols could make a significant impact and, together with effective management of malnutrition and HIV, could considerably improve outcomes in child healthcare.

Reported staff shortages have increased enormously from 41 reports in 2004 to 233 reports in 2005 for a similar total number of deaths, and further, staff shortages account for 29% of all administrative modifiable factors. The site reports indicate that 2005 staffing levels for paediatric wards have not improved since 2004. In addition to the lack of doctors at all levels of care, most sites now also experience severe nursing shortages, especially of professional nurses. The lack of staff and high attrition rates, particularly in under-served areas, make ongoing training and quality improvement a necessity.

As revenue collection has become a pressing need for hospital managers, staffing priorities may shift from paediatric services to adult wards, where patients are able to pay for services. Paediatric health workers will have to monitor this trend, as sick children and their families may not have any other advocates for their basic and urgent healthcare needs. Staffing norms (per inpatient) for doctors and nurses for all levels of child healthcare are urgently needed, so that effective monitoring, reporting and advocacy can be done. Strategies on how to

attract and retain senior health workers in the public sector, especially in under-served areas, need to be developed and effectively implemented.

Reports on lack of beds/overcrowding more than doubled from 59 in 2004 to 155 in 2005. As the HIV pandemic progresses, it is expected that more and sicker children will be admitted to hospital, despite an optimal roll out of ART for children. The number of high care and ICU beds for children must be increased and distributed equitably. This will also require the necessary staffing component.

AVOIDABLE DEATHS?

The question 'In your opinion, had the process of caring been different, would this death have been avoidable?' was added to the death data capture sheet towards the end of 2005 and was thus only completed for one-fifth of the audited deaths. However, for those reviewed deaths, a significant 45%, or more than two out of five, were considered to have been avoidable. It is not entirely clear what this means but it certainly reflects the need for improved care for sick children.

The significance of this information for the Child PIP audit process

Child PIP implementation

A mortality review process, such as Child PIP, is a low cost strategy that can improve the quality of care that children receive by improving the overall processes of caring for sick children and through specific life-saving interventions.[27] Child PIP sites can be seen as sentinel sites to improve knowledge on childhood mortality and to give information about comorbidity and synergies in causes of death. The data can be used for the monitoring and evaluation of child healthcare and to give feedback to health workers and managers. Inequities that may exist within a province can be identified. At local level, Child PIP may show that specific protocols and guidelines are missing.

Child PIP data collected on monthly tallies was still very problematic during 2005. Ward admission and discharge registers should capture information on weight categories as well as diagnosis (ARI and gastroenteritis) for all under-5 patients. The number of audited deaths should be used to crosscheck the monthly tally death data.

Site reports show that nurses are not yet actively involved in Child PIP in many hospitals. Managers and doctors should cooperate to change this. The nursing staff should take ownership of Child PIP as this will, in many instances, facilitate problem-solving and development of solutions to improve paediatric healthcare at all levels.

Decision-making for the delivery of high quality health services needs data at local, district and provincial levels.[20] Child PIP gives health workers and managers data for action. This data can be analysed with special focus, for example, looking at deaths during the first year of life to inform PMTCT or perinatal programmes. Finally, data could be used in the advocacy for the overall improvement of child healthcare.

Conclusion

Child PIP, as a clinical audit programme, analyses child deaths with the aim of improving quality of care for all sick children. Although improvements may well have occurred in many of the facilities using Child PIP, it remains an important tool for diagnosing weaknesses and gaps in the health system. Healthcare providers and health departments should use amalgamated Child PIP data gathered from different sites in South Africa to analyse and improve child healthcare. Analysis of the modifiable factors can indicate problems with the quality of care delivered by healthcare providers at all levels. Changes can be implemented and their impact monitored. Lack of appropriate staff, organisation and skills are major potential factors that may need improvement.

As the HIV pandemic in South Africa progresses, children admitted to hospital are sicker than before. The increasing numbers of severely malnourished children admitted with advanced symptomatic HIV infection reflected this in the 2005 survey. Child health will not significantly improve until the HIV pandemic is controlled and reversed. This must be the absolute priority. It needs major and consistent political will to make the health system fit to respond to the present HIV pandemic and to be able to sustain the fight. Prevention of paediatric HIV infection, although a complex process, is potentially the most effective lifesaving programme in South Africa today.

Most of the necessary interventions to reduce preventable child deaths are well known. The task now is to increase the coverage, especially in underprivileged populations and to improve delivery strategies for these interventions. Major political commitment and discipline are necessary to reach the millennium development goal to significantly reduce childhood mortality.

Both global and national inequity in health worker distribution is widespread and deteriorating. There seems to be an 'inverse information and care law': the communities with the greatest numbers of sick children and child deaths seem to have the least information on these deaths and the lowest numbers of qualified health personnel per population.[29] It is here where child advocacy and the implementation of children's rights in South Africa is a major challenge.

Findings of Child PIP may lead to focussed quality improvement programmes, for example to improve effectiveness, efficiency and productivity of health workers. Effective healthcare cannot succeed without increased funding for clinical infrastructure and appropriate personnel.[22] Clinical staffing levels in some areas are so low that clinical personnel can no longer be held liable or responsible for deficiencies in patient care which are caused by factors beyond their control. Health departments and managers should be held accountable for the urgent filling of vacant posts and for providing an equitable distribution of acceptable healthcare for all sick children of this country.[20]

It is encouraging to note that Child PIP has become a constructive routine in many of the active Child PIP sites and that new sites want to implement the programme. It remains a challenge to not only collect and analyse data but to continue with the audit loop to implement and monitor change in improving child healthcare.

The statement of the Bellagio group in 2003 is still relevant: "Translation of current knowledge into effective action for child survival will require leadership, strong and modified health systems, targeted human and financial resources to ensure that poor children and mothers benefit".[26]

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[29] Lawn J E, Cousens S, Zupan J, for the Lancet Neonatal Survival Steering Team. Neonatal Survival 1: 4 million neonatal deaths: When? Where? Why? *Lancet* 2005; 365: 891-900.

Chapter 2

Recommendations

Child PIP is providing new information about how children are cared for in the health system, and is quantifying that information already known intuitively by experienced health workers.

The 2005 Child PIP data highlights five areas of importance:

1) HIV/AIDS
   - Prevention: PMTCT services
   - Identification and treatment: ART services

2) Nutrition
   - At clinic level, underweight children must be identified, assessed and referred earlier
   - At hospital level, severe malnutrition must be managed effectively

3) Gold standards
   - At clinic level, IMCI needs to be strengthened and sustained
   - At hospital level, standard paediatric guidelines must be adopted or developed, and implemented

4) Norms to be established and implemented
   - Staffing for sick children
   - Equipment for sick children
   - Transport of sick children

5) Improve paediatric quality of care
   - Paediatric mortality review (Child PIP) at every institution

Child PIP information gathered in each of these areas provides the following recommendations. In drawing up the recommendations, an attempt has been made to pinpoint who in the health system is responsible for each component of the recommendation. It is hoped that by doing this, actual implementation can be realised.

The Child PIP Group presents these recommendations, with their implementation levels and responsibilities, as an interpretation of the information that has arisen directly from the survey. Neither the recommendations nor the suggested responsibilities can be prescriptive in a report such as this, but they are presented in a way that is intended to stimulate discussion and debate, which will in turn lead to action that will improve the quality of care that children receive in the South African Health system. This is a goal shared by all Child PIP users and by all those entrusted with caring for sick children.

HIV/AIDS

Preventing HIV infection in children

What Child PIP says

Only 54% of the children who died had been tested for HIV. Of these, almost half were HIV-infected and a further third were HIV-exposed. PMTCT data were lacking in two out of three deaths. In those with data, and at risk for MTCT, only 28% had PMTCT prophylaxis. Safe infant feeding (exclusive breast or formula) was practised in 26%. PCP prophylaxis with cotrimoxazole was given in 14% of all deaths but in only 19% of those diagnosed with PCP.

Recommendation

Greater effort must be made to reduce vertical transmission of HIV

Action

The PMTCT service must be strengthened.

Implementation

POLICY

- Universal HIV testing in early pregnancy (with opt-out) must become the norm.

- Pregnant women with CD4 counts of less than 300 should be fast-tracked for ART.
- All interventions, especially the administration of nevirapine, aimed at PMTCT should be clearly documented in the mothers' and babies' clinical records and in the Road-to-Health Charts (RTHCs).
- Follow-up of HIV-exposed and HIV-infected children must be integrated into immunization services, with particular emphasis on effective cotrimoxazole administration, and support for safe infant feeding choices.

Responsibility: National and provincial Departments of Health.

ADMINISTRATION

- Ensure local capacity for opt-out testing, clear documentation and ART provision for eligible pregnant women.

Responsibility: Institutional (clinics and hospitals), district and provincial managers.

CLINICAL PRACTICE

- Comprehensive perinatal care must be provided by all doctors and nurses responsible for perinatal care. Inherent in this is proper documentation of all clinical information:
  - HIV-infected women must be identified early and treated (including ART when indicated) appropriately.
  - HIV-infected pregnant women must be informed about safe infant feeding options, and individualised decision making based on each woman's particular socio-economic circumstances should be encouraged.
  - Follow-up for the HIV-exposed infant must be systematically institutionalised.
  - Trained staff should become the core, non-rotating members of the service delivery team.

Responsibility: Unit and district supervisors and managers (nursing and medical).

EDUCATION

- Medical and nursing students must be trained to provide comprehensive perinatal HIV care. HIV is arguably the most serious health challenge facing South Africa today. Medical and nursing curricula must respond to this challenge, so that medical and nursing graduates do not need to attend workshops on how to deliver comprehensive perinatal HIV services.

  Responsibility: Heads of nursing colleges and medical schools, specifically heads of obstetrics and paediatrics departments.

Identifying and treating children infected with HIV

What Child PIP says

A laboratory assessment of the HIV status of 46% of children who died was not done. Of those tested, 15% were negative, 37% were HIV-exposed and 48% HIV-infected. In terms of clinical staging of HIV, 17% of infected or exposed children were not clinically staged. Fifty percent of all the deaths were assessed as stage III or IV and thus eligible for ART, yet only 3% of deaths were documented as having received ART. Only 1% of mothers were documented as being on ART but information was lacking in 77%.

Recommendation

Provide ready and universal access to ART for children and their parents

Action

Increase capacity to improve ART services.

Implementation

POLICY

- All children should have an HIV PCR test done at six weeks of age at their first vaccination visit, so that infected children are identified early.

  Responsibility: National and provincial Departments of Health.

- Admissions to hospital should be seen as opportunities for accessing ART. All children admitted to hospital who have no documented HIV test, must be tested on an opt-out basis for HIV infection (PCR under 18 months, rapid serology over 18 months). Eligibility for ART must be established through CD4 testing and/or clinical staging.

Responsibility: District, institutional (hospitals and clinics) and unit managers.

ADMINISTRATION

- Laboratory systems must be developed to be able to meet children's need for universal PCR testing at six weeks of age.

  Responsibility: National Laboratory Service.

- Paediatric ART services need additional staff to treat the rapidly increasing number of patients.

  Responsibility: District, institutional and unit managers.

CLINICAL PRACTICE

- Labelling children "Known RVD" or "RVD +", a common occurrence in the audited deaths, negates the possibility for an holistic and appropriate HIV care plan. Doctors looking after hospitalised children must categorise all children's HIV status using, as an example, the classification system in Child PIP (laboratory status and clinical stage), which is in line with the teaching of paediatric HIV experts. Testing children should follow the opt-out approach. Barriers to testing should be seen as barriers to accessing ART for the child.

  Responsibility: Heads of paediatric departments and medical staff in children's wards.

EDUCATION

- Medical schools should ensure that graduates know how to classify children in relation to HIV and AIDS, and realise that HIV testing and staging improves quality of care, rather than reduces it.

- Child PIP data relating to HIV and AIDS can be used in training and education to highlight the poor assessment of children in the South African health system.

  Responsibility: Heads of paediatric departments at South African medical schools.

Nutrition

Early identification of children who are nutritionally compromised

What Child PIP says

Over 60% of children who died were underweight, and more than half of these had severe malnutrition.

Recommendation

Underweight children need to be properly identified, assessed and managed at primary healthcare level, and referred earlier if necessary

Action

Primary healthcare capacity for identifying and managing children who are nutritionally compromised must be improved by insisting on the implementation and use of IMCI and the Integrated Nutrition Programme (INP) in all clinics in South Africa.

Implementation

POLICY

- A national audit of clinic based nutrition services should be conducted to assess barriers to the proper nutritional assessment of children using IMCI, and to the comprehensive and efficient implementation of the INP.

  Responsibility: National and provincial Departments of Health.

ADMINISTRATION

- MCWH Directorates should conduct the audit.

  Responsibility: Directors, provincial MCWH.

CLINICAL PRACTICE

- Primary healthcare clinical personnel must identify and treat children who are nutritionally challenged according to basic principles of medicine and nursing using RTHCs, growth charts and IMCI.

  Responsibility: PHC supervisors and district managers.

- INP personnel should make their programme accessible to children in need, and should encourage clinical personnel to access the programme through a national awareness campaign. Cooperation between clinical personnel and dieticians must be strengthened.

  Responsibility: Integrated Nutrition Programme (INP) and district managers.

EDUCATION

- Medical schools need to emphasise growth monitoring and other preventative aspects of paediatric nutrition, so that graduates have a working knowledge of what is required at PHC level, and of the WHO Ten Steps for the inpatient management of a child with severe malnutrition.

  Responsibility: Heads of paediatric departments at South African medical schools.

- Nursing colleges must ensure that all graduates are able to weigh children and monitor their growth using the RTHC, and that IMCI forms the basis of the clinical assessment of children at PHC level.

  Responsibility: SA Nursing Council.

Managing children with severe malnutrition in hospital

What Child PIP says

Severe malnutrition was identified in one-third of all deaths. Sixty-three percent of assessed deaths were considered avoidable. Of the 694 modifiable factors related to clinical personnel in the wards, 42% were attributed to poor patient assessment and case management.

Recommendation

Children with severe malnutrition need emergency treatment and effective case management in hospital

Action

The WHO Ten Steps for the Inpatient Management of Severe Malnutrition must be implemented in all South African Hospitals immediately.

Implementation

POLICY

- The WHO Ten Steps case management for severe malnutrition should be adopted urgently as provincial policy and implemented in all provinces of South Africa.

  Responsibility: National and provincial Departments of Health.

ADMINISTRATION

- The WHO Ten Steps case management for severe malnutrition should be taught, implemented and monitored in all hospitals as a matter of urgency.

- Monitor case fatality rates for admissions with severe malnutrition. (Child PIP enables this.)

  Responsibility: District, institutional and unit managers.

CLINICAL PRACTICE

- Nurses and doctors working in children's wards must follow the WHO Ten Steps. Nursing Flow Charts should be developed to assist with the efficient administration and monitoring of the care process.

EDUCATION

- Medical schools and nursing colleges must teach the WHO Ten Steps.

  Responsibility: Heads of paediatric departments at South African medical schools, and heads of nursing colleges.

Gold standards for looking after sick children properly

Improving quality of care at primary healthcare level

What Child PIP says

Participation of primary healthcare (PHC) staff in audit meetings was limited and record of pre-hospital care was often incomplete. Nevertheless 15% of all modifiable factors occurred at PHC level. As the clinical personnel modifiable factors at PHC level are almost entirely based on IMCI guidelines, nearly 80% reflected a lack of IMCI implementation. There was a specific lack of IMCI assessment and management in 20% of cases. In addition, 31% of children died during the first 24 hours in hospital, providing a further pointer to problems with pre-hospital quality of care.

Recommendation

Sick children must be identified and managed correctly at PHC level

Action

IMCI must become and remain the priority programme for children at PHC level.

Implementation

POLICY

- IMCI should be a priority programme in the strategic plans of all provinces. This should be reflected in financial and human resource planning and management of the provinces.

- The IMCI community component must be rolled out.

  Responsibility: National and provincial Departments of Health.

ADMINISTRATION

- IMCI implementation needs to be strengthened and sustained at all PHC facilities.
- IMCI trained nurses must be supported, and evaluated every six months.

  Responsibility: Provincial MCWH.

CLINICAL PRACTICE

- IMCI, ART, TB and nutrition services must be integrated at all levels of care.
- All clinical personnel should use IMCI classification and case management at all levels of care as the minimum standard when caring for sick children. This must include continuous and consistent use of weight assessment and the RTHC.
- The Child PIP process should be linked to quality of primary healthcare by involving PHC staff in the mortality review process. Communication and cooperation between hospitals and clinics needs to improve. The Child PIP process may help to achieve this.

  Responsibility: Primary healthcare managers.

EDUCATION

- IMCI must be part of all medical and nursing curricula. IMCI pre-service training should be implemented in all institutions conducting nursing and medical education.

  Responsibility: Medical schools and nursing colleges.

- Doctors working with children, casualty staff and nurses in paediatric wards should be trained in IMCI.

  Responsibility: Unit managers and district MCWH co-ordinators.

- Further training for PHC workers must be provided where there is attrition of IMCI-trained clinic nurses.

  Responsibility: Provincial MCWH.

Improving quality of care at hospital level

What Child PIP says

Acute respiratory infections, sepsis, PCP, gastroenteritis and TB caused two out of three child deaths. Over 60% of children who died were underweight and almost half were HIV-infected or HIV-exposed. TB increased as a main cause of death from 2.7% in 2004 to 4.9% in 2005. Almost one out of two deaths was considered avoidable, with 52% of all modifiable factors related to substandard care by clinical personnel. Deficient case assessment, management and monitoring accounted for three-quarters of the modifiable factors related to clinical personnel.

Recommendation

Paediatric treatment guidelines and protocols should be systematically adopted or developed, and implemented

Action

Every health institution should have an identified set of standard treatment guidelines and nursing protocols that address the priority conditions of, and priority problems with the process of caring for sick children, as identified by Child PIP. Once identified, the most senior doctor responsible for the care of children in each institution must insist on its implementation.

Implementation

POLICY

- Policies and standards for first, second and third level paediatric hospital care and referral should be developed in all provinces.

  Responsibility: Departments of paediatrics at medical schools.

ADMINISTRATION

- All hospitals and community health centres must have protocols and training for paediatric triage, resuscitation and emergency transport.

- Obstacles to the implementation of standard treatment guidelines should be investigated and monitored. Child PIP may help in this regard.

  Responsibility: Institutional managers.

CLINICAL PRACTICE

- It is the responsibility of each individual health professional to be familiar with the assessment, management and monitoring

aspects of children in their care, and to refer at all times to the identified set of treatment protocols. The ability to assess severity of illness needs to be developed in all health workers working with children.

- Orientation programmes should be conducted to familiarise new staff with priority paediatric problems and with the identified institutional guidelines.

- Hospitals caring for sick children must ensure that ward rounds are conducted during weekends and public holidays.

  Responsibility: Medical managers and doctors in charge of children's wards.

> Standards which are helpful and widely used are the "WHO Pocket Book of Hospital Care for Children", the South African "Standard Treatment Guidelines and Essential Drugs List, Hospital Level Paediatrics" (2006), the "Handbook of Paediatrics" by Harrison (Oxford 2004) and "Paediatrics and Child Health" by Coovadia and Wittenberg (2004).

EDUCATION

- The paediatric curriculum at medical schools should encourage an awareness of priority childhood morbidities and mortality. The focus should shift from "How to make a diagnosis" to "How to look after a sick child". Standardised treatment guidelines that originate in the needs of sick children rather than on the qualification of the person looking after them, should be encouraged.

- Information arising from the Child PIP process suggests that a revisit of the initiative to develop a South African "Core Paediatric Curriculum" is warranted.

- The Child PIP team would also like to encourage the participation of paediatric academics in the mortality review processes conducted in regional and district hospitals. This would provide important feedback to paediatric educators about the capacity of South African graduate doctors to care for sick children in South African hospitals.

  Responsibility: Heads of paediatric departments at South African medical schools.

Norms for resource provision for sick children

Staff provision

What Child PIP says

Lack of staff was recorded in the 2005 Child PIP data on 233 occasions, accounting for 29% of the hospital administrative modifiable factors. This figure has increased more than five times since 2004, and may still be under-reported. The main shortages were of professional nurses (especially after hours) and senior doctors (post community service).

Recommendation

Staffing norms for sick children must be developed, urgently implemented and sustained, for each level of care

Action

Develop a National Department of Health sanctioned guideline on staffing norms for child health services at all levels.

Implementation

POLICY

- Develop national norms for staffing children's health services at all levels of care and distribute to the provinces for implementation.
- As patient monitoring, treatment, feeding and the management of IV fluids in paediatric wards require specialized and continuous attention and supervision by stable and experienced staff, it is vital that non-rotating core teams of staff are developed.

  Responsibility: National and provincial Departments of Health.

ADMINISTRATION

- Each institution must create organograms that reflect national staffing norms and provincial directives, and then create post establishments and funding necessary to achieve this goal.
- Coverage by clinical personnel (doctors and nurses) during the night and at weekends needs special attention.
- The employment and retention of clinical personnel in paediatric services should be made a key performance area for hospital managers.
- Understaffed hospitals must prioritize the filling of vacant doctors' and nurses' posts.

- Staffing levels in paediatric health services need to be monitored regularly.

  Responsibility: Institutional management with the support of provincial health departments.

CLINICAL PRACTICE

- The development of clinical skills in paediatrics must be encouraged at all levels for all staff members. Where aptitude and commitment are shown, staff members should be acknowledged and nurtured. Core teams must be established and staff rotation systems that disrupt core service delivery teams must be abolished.

- Paediatric nurses should be responsible for paediatric wards in district hospitals.

- Doctors receiving sick children in casualty or working in paediatric wards need support from senior doctors with paediatric experience.

- Regular in-service training for nurses and doctors, from hospitals and the district, should be guided by findings from Child PIP.

  Responsibility: Hospital and unit managers.

EDUCATION

- Appropriate standards of care can only be implemented if a core team of professional nurses and senior doctors, with relevant training and experience, are stabilized in and dedicated to paediatric wards.

- Medical and nursing students need to understand the importance of managing paediatric units properly, from early in their training.

  Responsibility: Medical schools and nursing colleges.

Facilities, equipment and consumables

What Child PIP says

In the 1 543 deaths, 807 administrative modifiable factors were identified. Almost one-third of these related to lack of access or facilities for sick children, especially a lack of high care beds and

resuscitation areas. Nine percent related to lack of equipment (especially pulse oxymeters, in an environment where most deaths are due to acute respiratory infections) and 7% to a lack of drugs and IV fluids.

Recommendation

Equipment norms by level of care must be created and implemented for every institution caring for sick children

Action

National norms for facilities, equipment and consumables need to be developed for each level of paediatric care.

Implementation

POLICY

- National and provincial norms for equipping children's health services at all levels of care must be developed and implemented.

  Responsibility: National and provincial Departments of Health.

ADMINISTRATION

- Every hospital caring for sick children should have a paediatric resuscitation kit in a designated area of the casualty department.
- The number of paediatric high care and ICU beds should be increased and equitably distributed between all provinces.
- All paediatric wards, including those in district hospitals, should have a designated, appropriately staffed and equipped high care area.
- Lodger mother units should be available in hospitals that offer paediatric inpatient care to improve feeding and monitoring of sick children.
- Equipment pools must be established and efficiently administered, and have efficient maintenance systems. Consumables must be efficiently stocked and provided.
- Paediatric resuscitation equipment and consumables should be prioritized.

  Responsibility: Institutional and unit managers.

CLINICAL PRACTICE

- Doctors and nurses must have access to the basic equipment norms for each level of healthcare and be responsible for the use and early reporting of any malfunctioning equipment.
- Consumables need to be carefully organised and economically used, without in any way compromising the quality of care given to sick children.

Responsibility: Doctors and nurses in charge of children's wards.

Transport

What Child PIP says

One-third of the deaths occurred during the first 24 hours in hospital.

Recommendation

Transport norms for sick children need to be developed and / or implemented

Action

Sick children must be assessed, managed and monitored properly both before and during transfer from one health facility to another.

Implementation

POLICY

- National norms must be developed for pre-transfer assessment, management and monitoring of sick children, as well as for ambulance waiting times and in-transit monitoring and management.

Responsibility: National and provincial Emergency Medical Rescue Services (EMRS).

ADMINISTRATION

- Every hospital caring for sick children should have the required facilities for stabilising patients prior to transfer, and while awaiting the arrival of the EMRS.

Responsibility: Institutional managers (hospitals and clinics).

CLINICAL PRACTICE

- Medical and nursing staff must ensure the proper pre-transfer assessment, management and monitoring of sick children. Once transport is arranged, the child must continue to be cared for under close supervision. Experienced medical and nursing staff must be involved in the transfer process.

- Communication between clinical personnel working for the same catchment population, at different levels of care needs to be improved. Joint Child PIP meetings and evaluations may be helpful in this regard.

  Responsibility: Medical managers, doctors and nurses in charge of children's wards.

EDUCATION

- Undergraduate training of doctors and nurses must include teaching on the importance of pre-transfer assessment, in-transit management and monitoring of sick children between health facilities.

  Responsibility: Medical schools and nursing colleges.

Improving paediatric quality of care

Child healthcare data and Child PIP

What Child PIP says

The Child PIP survey of paediatric deaths in 2005 provided robust information about children: their demographics, their social and health contexts (nutrition and HIV/AIDS), how fast they died in hospital and what they died of. It also provided robust information about the quality of care children received from those entrusted with caring for them. As hospitals that participate in audits generally provide a better quality of care, it could be assumed that those who do not yet participate in audits may have even bigger problems.

Child PIP describes the experience of children in South African hospitals in detail, and in a way that enables problem identification and therefore problem solving to occur, so that real improvements can be made in the quality of care that children receive.

Recommendation

Paediatric mortality / quality of care audits should occur in all institutions caring for sick children

Action

Child PIP to be implemented in all hospitals in South Africa.

Implementation

POLICY

- All paediatric deaths occurring in the healthcare system should be audited with a view to assessing quality of care.

- Districts should amalgamate and review local data six-monthly to consolidate insights gained and monitor outcomes.

  Responsibility: National and provincial Departments of Health.

ADMINISTRATION

- Institutional managers should encourage structured quarterly paediatric quality of care audits, using the mortality review process as the framework.

  Responsibility: Institutional managers.

CLINICAL PRACTICE

- Clinical audits should become part of the routine day-to-day clinical practice.

- The mortality review process outlined in Appendix E provides a framework for regular audit meetings.

  Responsibility: Paediatric unit managers.

EDUCATION

- Clinical auditing, and especially the ability to reflect on mortality and morbidity in a structured way, should be taught at undergraduate level at medical schools and nursing colleges. South Africa has three excellent home-grown examples of the structured death audit process which targets, in addition, quality of care. These are the Confidential Enquiry into Maternal Deaths (CEMD), the Perinatal Problem Identification Programme (PPIP) and Child PIP. All these tools are potentially readily available to undergraduates.

  Responsibility: Heads of medical schools and nursing colleges.

- Child PIP findings should be published annually and presented regularly at relevant conferences such as SAPA, RuDASA.

  Responsibility: Child PIP executive committee.

Chapter 3

Making Mortality Meaningful

Change through death auditing

Introduction

Quality of care, quality assurance and quality improvement programmes are concepts and practices that have become integral to clinical practice over the last ten years. But what do they mean? One way of answering that is to ask ourselves, for each patient we meet, about the care we provide: "Is this the best I can do?". But what is it that should be improved upon and what should the goals be?

This chapter looks at how the process of mortality auditing may help answer these questions and thereby improve the quality of care currently available in the South African healthcare system.

History

In order to start understanding mortality it is useful to consider the evolution of ideas and thoughts on the occurrence of death.

The Clinical Pathology Conference

The seeds of the clinical pathology conference (CPC) were sown by Morgagni in 1769 when he published his book in which the symptoms for 700 patients were correlated with post-mortem findings. The attachment of symptoms to post-mortem findings lead to a "scientific" treatment and logical prognostication for individual patients. Illness was better understood for individual patients by "medically" analysing each death.

Mortality rates

In 1880, Florence Nightingale first suggested the publication of mortality rates, but her ideas went largely unnoticed. Shortly thereafter Semmelweiss, an obstetrician, used mortality rate data to show that hand washing decreased maternal deaths.

Semmeweiss's findings encouraged others to generate mortality rates for populations and for the first time, scientists could compare rates over time and across geographical areas. This in turn led to an understanding of whether something was better or worse, and trends could be analysed in time and regional frameworks.

Avoidable mortality

In 1976, the concept of avoidable mortality was introduced by Rutstein. Mortality rates were generated for populations and then compared with a "gold standard", which represented the area in the world with the lowest mortality rate. The difference in mortality was then presumed to be the avoidable mortality.

Avoidable / modifiable factors in mortality

It is only as recently as 1980 that researchers first attempted to examine avoidable factors in deaths. In South Africa rigorous analysis of avoidable factors was pioneered and then became established through the Confidential Enquiry into Maternal Deaths (CEMD) and the Perinatal Problem Identification Programme (PPIP). More recently the Child Healthcare Problem Identification Programme (Child PIP), which looks at modifiable factors related to paediatric inpatient deaths, was developed.

The return to individual patient assessment through the process of identifying avoidable or modifiable factors in specific deaths has contributed to a greater understanding and clearer assessment of the quality of the processes of caring for individual patients.

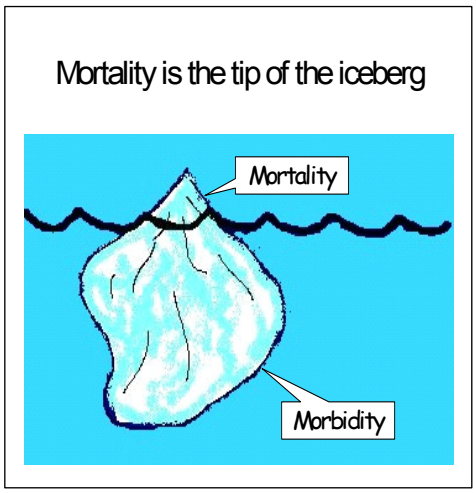
The mortality audit process

Disease affects people (individuals) by causing morbidity and mortality. And a health system is required to do the work of caring for populations of people. This carries costs in terms of money and human resources. Information about disease becomes important

because, by asking "Is this the best that can be done?" we are then able to examine:

1. the quality of care received by individual patients; and
2. the efficiency of the health system.

Disease is quantified or profiled by the indicators, morbidity and mortality. But morbidity, compared with mortality, can be very difficult to define and therefore to quantify. So mortality is often the indicator of choice. In using mortality as the preferred indicator, however, morbidity is not necessarily lost to scrutiny as mortality is really the tip of the iceberg, either for a particular disease, or for a particular site.



How mortality audits affect quality of care

There are underlying unavoidable deaths at all levels of care. But in South Africa, the more remote and rural sites show an increasing numbers of avoidable deaths. This has been shown consistently by the Confidential Inquiry into Maternal Deaths, and the Perinatal Problem Identification Programme, and now also by Child PIP. By looking at avoidable factors in mortality reviews, the challenge for health workers is to make significant impact on avoidable deaths in order to decrease mortality (and thereby, morbidity).

Defining and categorising modifiable factors

A modifiable (avoidable) factor is a missed opportunity for good care or an instance of suboptimal care which may have contributed to a child's death. Children are cared for at home, in clinics and hospitals (outpatient and inpatient), and by families, health workers (doctors and nurses) and administrators (politicians and managers). So when assessing modifiable factors it is necessary and useful to determine **where** they have occurred, and **who** is responsible. By looking at where they occur and who is responsible, it becomes possible to identify and prioritise problems, and to devise solutions to correct the problem.

A comprehensive list of common modifiable factors should be drawn up and referred to when each death is analysed. Examples of modifiable factors are given in the table below:

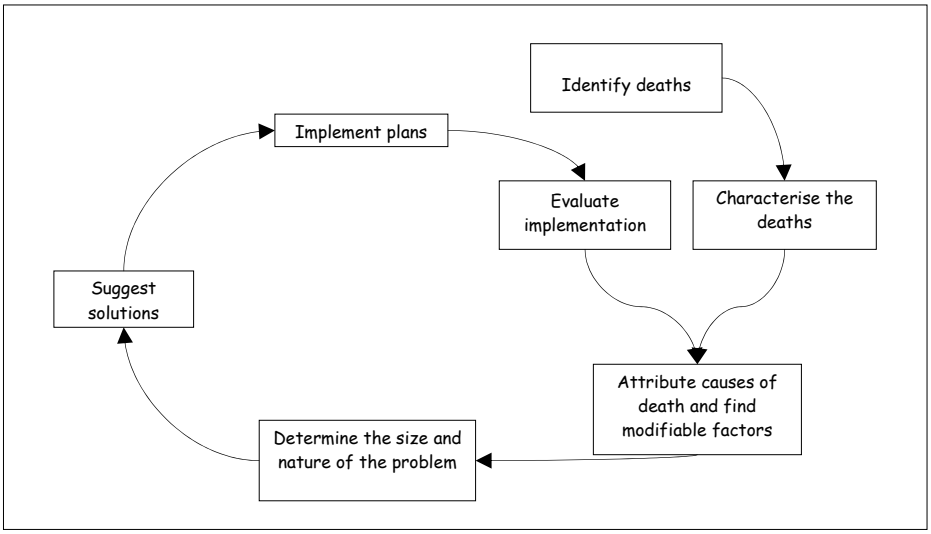
	Family/Caregiver	Administrator	Health worker
Home	Delay in seeking care, child taken to clinic with advanced disease		
Clinic		No transport from clinic to hospital	IMCI guideline not followed in child with severe diarrhoeal disease
Outpatients		Insufficiently trained staff on duty	Volume expander not given to shocked child
Inpatients		No pulse oxymeter for child with severe pneumonia	Oxygen not given to child with severe pneumonia

Steps followed in death auditing

The steps to follow in death auditing are:

1. Identify and characterise deaths and determine a mortality rate.
2. Attribute cause to the deaths.
3. Find modifiable factors.
4. Based on findings, determine the size and nature of the problem, and seek reasons for findings, in order to make changes.

The audit loop below, illustrates the death auditing process:



The mortality review process

The mortality review process consists of a review of the causes of children dying in hospital, and this enables the examination of quality of care that children receive. The mortality review process in a paediatrics ward consists of two main activities:

1. Data collection, and
2. Mortality review.

Data collection

Two data sources are needed to conduct a mortality review: (a) the ward register (which records admissions, discharges and deaths); and (b) individual clinical records of the children who die. It is useful to keep a separate register of children who die so that their medical records can be traced. Admission and deaths information should be captured on monthly tally sheets and detailed information on each death should be captured on a death data capture sheet designed specifically for the purpose.

The review process

The components of the mortality review process are best summarised in the following table:

Component	When	Who	Purpose
24 hour review	Each death should be reviewed and summarised within 24 hours	The attending doctor or nurse at the time of the death	Ensure all necessary information is captured at a time when information is available
Preparatory Meeting	Before the Mortality Review Meeting	The doctor and nurse in charge of the ward/unit	A detailed analysis of all deaths, with case selection for presentation at the Mortality Review Meeting. Compilation of monthly statistics for presentation at the meeting
Mortality Review/Child PIP Meeting (see below)	Weekly or monthly depending on load	Whole paediatric department (doctors and nurses) as well as clinic staff	Presentation of statistics, case discussions and task reviews. Assign new tasks based on each meeting's discussion
Epidemiology /Analysis	Biannually/ Annually	Managers and clinical personnel	Broader problem identification with trend assessment, with solutions/recommendations.

Adapted from Philpott and Voce: "4 Key Components of a Successful Perinatal Audit Process", Kwikskwiz #29, 2001

The mortality meeting

Mortality review meetings must be well organised and managed by the nurse and doctor responsible for the paediatrics ward. The discussions at meetings should be confidential. The following are guidelines:

1. Meetings should be held at least once or twice a month, depending on the number of deaths.

2. A suitable time and venue is needed.
3. All staff involved with child care should be invited (nurses, doctors, allied health workers and administrators). Staff must understand that mortality meetings are very important. It is especially helpful to invite staff from clinics referring to the hospital.
4. A summary of each death should be prepared before each meeting.
5. The meeting should by consensus establish the main cause of death and then look carefully for modifiable factors. The meeting must never become a witch hunt, and should be confidential. The meeting should not be dominated by senior doctors as the thoughts and insights of all participants make the meeting worthwhile.
6. All decisions (causes and modifiable factors) must be recorded on the mortality sheets (death data capture sheets) for entry later into a database.
7. Problems with the process of caring for children in the hospital, the referring clinics and in communities must be identified and prioritised, and plans should be made and documented for addressing each problem.
8. Tasks arising out of discussions around cases should be assigned to team members, and minuted. Progress with the tasks should be reviewed at the start of the next meeting.

If there is insufficient time for auditing all deaths in the meeting, the doctor and nurse in charge can review individual files to analyse each death.

Once all the information has been entered into a database, it becomes possible to interpret the data, and determine problem areas. It is at this stage that long-term solutions should be devised and implemented.

Making a difference

The main objective of mortality auditing is to improve the quality of care that children receive at all levels of healthcare. Through the audit process itself, improvements will be implemented on a month-to-

month basis as problems are publicised for the first time, and tasks are assigned and completed. The entire process is strengthened if local data is submitted for provincial and national amalgamation so that broader trends can be assessed.

When devising solutions, it is helpful to categorise them by type of recommendation and level of responsibility as illustrated in the following table:

		TYPE OF RECOMMENDATION			
		Policy	Administration	Practice*	Education
LEVEL OF RESPONSIBILITY	National Department of Health				
	Provincial Department of Health				
	Hospital				
	Clinic				
	Home/Community				
	University/College				

* *Practice = how children are cared for in the health service (clinical practice), and at home*

Sustainable and substantial change can only be ensured once the information is carefully compiled, analysed and interpreted in the form of a report. The report should also include the recommended solutions to the problems, and progress with the implementation of these solutions. The proposed responsibility for implementation of each recommendation should also be clearly stated.

Conclusion

Once the team has completed the audit process, and entered the audit cycle, it is important to monitor plans that have been implemented and to check whether the answer to the question "Is this the best I can do?" has changed from "No", to a reflective "Yes".

Chapter 4

Witbank Hospital: A Case Study

Closing the audit loop

Witbank Hospital is situated in the Nkangala district in Mpumalanga. It is the main referral hospital for all 25 provincial hospitals. The population served by Witbank Hospital is 300 000, and there are 10 primary healthcare (PHC) facilities and 2 community health centres (CHC) in the municipal district.

Identifying the problem

During analysis of the Witbank Hospital's Child PIP data at the end of 2004 and beginning of 2005, it became clear that deaths due to suspected pneumocystis pneumonia (PCP) constituted the biggest single cause of mortality (44% of all child deaths were due to PCP). Further analysis revealed that the failure of the PMTCT programme in the district could be linked to this high mortality rate. In every single PCP death either the mother had never been on the PMTCT programme or some mistake had been made during the execution of the programme (e.g. no cotrimoxazole prophylaxis from six weeks).

Analysing the problem

The staff of the Witbank Hospital investigated the failure of the PMTCT programme in the district. The main problem was that only 15% of all pregnant mothers agreed to be tested for HIV during their antenatal visits. The main reason was the poor counselling offered during the first antenatal visit. Group counselling was given by sisters who did not fully understand the benefits of the programme, an opt-in system was in place and interviewed mothers clearly did not

understand the potential benefits of PMTCT. There was also a confusing coding system for recording HIV test results.

Developing a solution

It was postulated that a decrease in PCP deaths would occur if improvements were made to the PMTCT programme. The main initial focus was on increasing the number of mothers consenting to testing for HIV during antenatal visits, as well as improving the rest of the programme execution down-line. The Child PIP data were used extensively to convince health administrators and practitioners to change both practice and attitudes.

Testing and implementing the solution

The following steps were taken beginning in March 2005:

Provincial level

A meeting was held with the provincial PMTCT coordinator as well as the provincial MCWH coordinator where the findings were discussed. The province was already well aware of the poor PMTCT uptake figures and the director of the provincial HIV unit sent out a circular to all clinics and hospitals stating that:

- All pregnant mothers were to receive individual counselling about PMTCT,
- The opt-out system was to be used, and
- All units would be carefully monitored for any improvements.

In addition, many additional nurses attended PMTCT training.

These measures contributed to increasing the PMTCT uptake rate. Although the increased uptake may have occurred without the intervention, it is believed that the figures helped in underlining the seriousness of the situation.

The Witbank Hospital also undertook to raise awareness about the PMTCT programme in the province. Every opportunity was taken to promote PMTCT. Formal lectures on the subject were given at the paediatric nurses forum of Mpumalanga (± 250 nurses), at provincial

IMCI training (± 80 participants) and the provincial PPIP meeting (± 150 delegates).

Local district level

Intervention at this level mostly involved using the Child PIP data to raise awareness in different forums such as perinatal mortality meetings, at local clinic visits and student lectures, as well as for district MCWH, PMTCT and primary healthcare co-ordinators.

Evaluating and monitoring change

In the first three months there was a substantial increase in the number of mothers agreeing to be tested (up to 85% in some clinics). However, it tapered off somewhat so that for the year March 2005 - February 2006 just over 60% (compared to the initial figure of 15%) of all pregnant mothers decided to be tested for HIV in the Witbank district. This led to an increase in the proportion of newborns receiving nevirapine.

The mortality data for the first eight months of 2005 and 2006 was compared. The data showed an almost 60% decrease in PCP deaths after intervention, as well as a significant decrease of 37% in the overall inpatient death rate, due primarily to the decrease in PCP deaths as the other death rates remained stable. PCP now accounts for only 19% of the hospital's child deaths (previously 44%).

	January - August 2005	***January - August 2006***
Total paediatric admissions	1418	1786
Total deaths	85	68
Inpatient death rate (%)	6,0	3,8
PCP deaths	38	13

The Witbank Hospital paediatric staff believes that PCP deaths can be reduced even further by continuing to improve the PMTCT programme, and will continue to implement all activities described above. The hospital staff will remain focused on the implementation of the rest of the programme and will continue to monitor its impact.

PART THREE:
HIV REVIEW

Chapter 5

Child PIP and HIV/AIDS in South Africa

Understanding and responding to the impact of HIV on children depends on having as much information as possible. The Child Healthcare Problem Identification Programme (ChIP) has joined other information sources in describing this impact.

In the early 1990s, following experiences in eastern and southern Africa, various predictions were made regarding the impact of the HIV pandemic on the children of sub-Saharan Africa. These focussed primarily on the social sequelae associated with orphanhood and increased dependency ratios, and to a lesser extent, on increasing morbidity and mortality rates for both infected and affected children. Predictions of a two-fold increase in infant and three-fold increase in under-5 mortality rates were widespread.

In South Africa annual antenatal HIV sero-prevalence studies among pregnant women attending antenatal clinics in the public health sector have provided a longitudinal view of the local HIV/AIDS epidemic over the past nineteen years. Unfortunately there is no equivalent view of the paediatric or childhood epidemic in the country. Consequently current insight into the extent of the paediatric epidemic is limited to extrapolations from the annual antenatal surveys, one-off samples from hospital data or community surveys and mathematical modelling.

Extrapolations of the 2005 annual antenatal HIV sero-prevalence survey[1] estimate that there were 235 000 HIV-infected children in South Africa under 15 years of age. This is a small proportion of the 5,54 million infected people and a total adult infection rate of 16.25%. This figure is similar to the 2004 Medical Research Council (MRC) demographic models[2] projection of 245 000 infected children or 1.7% of the childhood population.

Community-based surveys generally identify higher childhood sero-prevalence rates. The 2002 Human Sciences Research Council (HSRC) study established that 5.6% of children aged 2-14 years were HIV-infected[3]. More recent clinic based surveys in KwaZulu-Natal identified 7.6% of 6-week-old infants with positive HIV RNA tests[4], reflecting a vertical transmission rate of 20.8% despite widespread programmes for the prevention of mother-to-child transmission of HIV.

As expected, these projections and sero-prevalence figures will yield an increase in mortality rates. The MRC[2] anticipated an infant mortality of rate of 56 and a child mortality rate of 87 per thousand in 2004 whilst clinic based "previous death" questionnaires in KwaZulu-Natal revealed a child mortality rate of around 90[5] in 2005.

Inpatient hospital data is limited and what is available is extremely variable, reflecting not only the stage of the HIV epidemic in that locality but also the clinical practice and testing policies of individual clinicians or hospitals. Unfortunately while this data does to some extent document the burden of the epidemic on the children's wards of

[1] Department of Health. National HIV and syphilis antenatal sero-prevalence survey in South Africa – 2005. Pretoria. 2006

[2] Dorrington RE, Bradshaw D, Johnson L, Budlender D. The Demographic Impact of HIV/AIDS in South Africa. National indicators for 2004. Cape Town: Centre for Actuarial Research, South African Medical Research Council and Actuarial Society of South Africa. 2004

[3] Shisana O, Bezuidenhout F, Brookes HJ, Chauveau J et al Nelson Mandela/HSRC Study of HIV/AIDS: South African National HIV Prevalence, Behavioural Risks and Mass Media. Household Survey 2002. Cape Town: HSRC Publishers. 2002

[4] Horwood C. HIV prevalence rates amongst 6 week old infants in south Africa: the case for universal screening at immunization clinics. Paper presented at Rudasa 10th Annual Conference on Rural Health. Empangeni. August 2006

[5] Rollins N. Personal communication.

South African hospitals, it fails to reflect the overwhelming impact of the epidemic on individual children, their families and those health professionals who care for them. Initial feelings of helplessness and futility should be fading as interventions for the prevention of mother-to-child transmission (PMTCT) and the treatment of infected children with antiretroviral therapy (ART) are rolled out.

To a limited extent the national Child PIP data provide an opportunity to review the role of HIV in the deaths of children in participating hospitals, to assess the care these children have received and to evaluate the effectiveness of the PMTCT and ART programmes.

The 2005 data reports on 1 587 deaths, including 938 (56%) infants, in 15 participating hospitals. Of these deaths the HIV status was assessed in 36,5%, known in 34% and HIV infection was documented in 26%. Interestingly the likelihood of finding a documented HIV test increased with each age cohort from 35% in the 1–12 months age cohort to 75% in children over 13 years of age. The clinical status of the children, reflecting possible progression to AIDS, was recorded by HIV staging in 59% of the records. Understandably this represented a high proportion of stage III and IV disease, though less understandable is that clinical staging was done most frequently in children dying within the first month of life. Fewer than 50 children were receiving ART at the time of their death, all with stage III or IV disease. Information regarding the participation of the mothers of the dead children in the PMTCT programme was available for 37% of the deaths and less than 5% of these mothers had received nevirapine.

The above data could reflect a limited role for HIV in these deaths, poor or incomplete clinical records or poor clinical practice. Considering the number of records that report an HIV clinical stage it is obvious that HIV is a consideration in most cases where children have died. However the low rate of HIV testing is disconcerting and could suggest a lack of laboratory support, a belief in the futility of testing and treatment or an inaccessible ART programme.

While one must be careful not to read too much into limited data the low rate of HIV testing and low uptake of PMTCT and ART programmes reflected in the Child PIP data is of concern and represent missed opportunities for improving the care of children in South

Africa. An awareness of HIV infection in children is obviously present but needs to be converted into more positive action. Among these:

- Laboratories need to provide PCR testing so that HIV infection (as opposed to exposure) can be assessed in all infants.
- Clinicians need to lower their threshold for HIV testing. It is now time that the issues around universal testing are debated.
- Access to PMTCT and ART programmes need to be reviewed and obstacles eliminated.
- The integration of perinatal programmes, routine child health services and inpatient care needs to be ensured so that HIV-exposed children are effectively monitored and appropriate interventions undertaken timeously.
- Admission to hospital can and should be used as an opportunity to access ART.

Insights gleaned from the above Child PIP data regarding HIV and childhood deaths provide an invaluable opportunity for an improved response to this epidemic. Failure does not lie in the data, which portrays an inadequate service, but will result from an inadequate response to this insight and a failure to correct the visible deficiencies.

Chapter 6

PMTCT in South Africa and Botswana

The SA National Prevention of Mother-To-Child Transmission Programme

Background

The South African National Prevention of Mother-to-Child Transmission (PMTCT) Programme started in June 2002 as a two-year pilot project. The pilot project started with two sites per province, one rural and one urban, yielding a total of 18 sites. At the time of the pilot, a PMTCT site was defined as including a hospital and its adjacent feeder clinics. The pilot phase focused on the identification of HIV-positive women and the provision of nevirapine (NVP) to the pregnant HIV-positive woman and her newborn infant with the aim of reducing vertical transmission. The purpose of the PMTCT pilot was not to assess the efficacy or safety of NVP, as this had already been established in the HIVNET012 study, but rather to assess operational challenges inherent in the introduction of antiretroviral treatment (ART) treatment into routine maternal and child health service delivery, and to determine strategies to address challenges that arose during implementation.

Midway through the pilot phase, the programme was expanded to ensure that every pregnant woman could access NVP. This resulted in rapid scale-up and expansion, but as a result of the pace at which provincial expansion took place, there was no time to address many of the operational challenges that arose during the pilot implementation.

Furthermore, expansion occurred prior to the availability of the pilot evaluation results, and when these results were finally available, service delivery had expanded to more than 60% of health facilities. With rapid expansion, the focus of the programme shifted to ensuring availability of NVP for women, by counting the number of sites that were able to administer NVP rather than addressing operational challenges inherent in the introduction of a new service within the context of routine maternal and child health services.

The primary goal of the national PMTCT programme is to reduce mother-to-child HIV transmission by:

- Improving access to HIV testing and counselling in antenatal clinics,
- Improving family planning services to HIV-positive women, and
- Implementing clinical guidelines to reduce the transmission of HIV during childbirth and labour.

In order to achieve this goal, the current PMTCT programme consists of the following elements:

- Service delivery as part of existing maternal and child care services.
- Group education sessions on PMTCT.
- Opt-in voluntary counselling and HIV testing (VCT), including pre- and post- test counselling.
- Safe infant feeding practice counselling, which allows mothers to make informed choices in infant feeding practice.
- Provision of formula for those mothers that choose to formula feed (6 month supply).[1]

[1] Some provinces provide breastfeeding mothers with 6 months supply of free infant formula at cessation of breast feeding.

- Nevirapine (for mothers and babies):
  - Maternal dose is self-administered at the onset of labour
  - Neonatal dose is given at the health facility within the first 72 hours of life, only if the mother has self-identified as being HIV-positive or is in the PMTCT programme
- Multivitamins (for mothers and babies).
- Treatment for opportunistic infections, including TB.
- Post-delivery follow-up for women.
- Cotrimoxazole prophylaxis for infants from 6 weeks.
- Testing of infants at 12 months, PCR pilot (2 sites per province).
- Referrals to ART services.

National programme targets

At the outset of programme expansion, based on international guidelines and evidence-based research, the national programme set the following targets:

1. Universal coverage by March 2006.
2. Eighty percent of all pregnant women to receive VCT during antenatal care (ANC) by March 2006.
3. Seventy-five percent of HIV-positive pregnant women to receive nevirapine by March 2006.
4. Fifty percent reduction in vertical transmission by 2008.
5. Vertical transmission reduced to less than 10% by March 2008.

Data from April 2004 - March 2005 (FY 04/05) indicates just how far the national programme is from achieving these targets.

Target 1: Universal coverage by March 2006

Although expansion has been successful and PMTCT service delivery is available in 3 064 facilities, this translates into 78%[2] of facilities offering PMTCT around the country. Coverage varies by province, with the Western Cape, KwaZulu-Natal and Gauteng achieving almost universal coverage. At the end of FY 04/05, PMTCT services were available at all hospitals, almost all community health centres and most clinics. Expansion to mobile clinics still needs to take place. Coverage data only give an indication of designated PMTCT sites and are not a measure of functionality of PMTCT facilities. It does not take into account how often services are available at the designated facilities.

Target 2: Eighty percent of all pregnant women to receive VCT during ANC by March 2006

During FY 04/05, approximately 1 112 240[3] babies were born. In order to achieve the above mentioned target, 889 792 pregnant women should have received voluntary counselling and testing (VCT) during pregnancy. Data from the national programme indicates that during FY 04/05, 533 610[2] pregnant women (47.9%) received VCT services. This means that at entry point into the PMTCT programme, more than 50% of women were missed. Missed opportunities at entry into PMTCT further hinder achievements of the national programme targets #4 and #5 listed above, namely the reduction in transmission rates.

Target 3: Seventy-five percent of HIV-positive women to receive NVP by March 2006

In achieving this target, the NVP coverage rate should be 75%. The NVP coverage rate is a measure of antenatal prevalence and NVP administration to mothers. During FY 04/05 not all of the women who tested positive for HIV during pregnancy and were enrolled into the PMTCT programme, received NVP. The national NVP coverage rate was around 30%, indicating further missed opportunities in PMTCT. It is important to note, that since NVP is self-administered, the NVP coverage rate only measures NVP dispensed not NVP taken.

[2] Data from provincial reports and communication with provincial PMTCT programme managers

[3] DHIS data

The inability to achieve targets #1, #2 and #3 above has had severe consequences on the achievement of targets #4 and #5. Even more worrying is that due to high loss to follow-up of infants born into the PMTCT programme and poor patient tracking systems, it is extremely difficult to measure the impact that PMTCT has had on the reduction of vertical transmission.

Weaknesses in the SA PMTCT programme

A closer analysis reveals a number of weaknesses and challenges to implementation in the South African PMTCT programme:

- Contrary to the programme goal, the focus is not on improving child survival for HIV-exposed infants and children, but on reduction of vertical transmission. By shifting the focus of the goal to include child survival, the PMTCT programme would not stop at delivery but would extend to follow-up support visits (including IMCI), support for safe infant feeding practices, HIV testing at 6 weeks of age using PCR or 12 months of age using ELISA, and referral for ART where indicated.

- PMTCT still operates as a vertical programme and integration into existing maternal and child health services has not occurred. Opt-in voluntary counselling and testing hinders participation in the PMTCT programme as it requires women to opt-in to individual counselling. Anecdotal evidence suggests that women do not opt in to counselling for fear of stigmatization or being labelled as HIV-positive. Nevirapine is given to women at 28 weeks gestation, to self-administer at the onset of labour. This poses many challenges, as women need to understand the signs and symptoms of early labour, remember to take the nevirapine and tell the healthcare worker that she has taken it, to ensure that her neonate receives nevirapine within 72 hours of birth. Furthermore, the inability of the healthcare worker to identify HIV-exposed infants prevents them from receiving cotrimoxazole from 6 weeks of age and results in high rates of loss to follow-up and low rates of HIV testing in HIV-exposed infants. In addition, a poor linkage with ART for pregnant women has resulted in

many women who are eligible for Highly Active Anti-Retroviral Therapy (HAART) during pregnancy not being able to access it. The South African Comprehensive Plan indicates that all pregnant women with CD4 counts below 200 are eligible for HAART. However, in order for women to access HAART, CD4 testing must take place at antenatal care sites, and eligible women should be referred appropriately. Women who are not eligible for ART should be referred after delivery for monitoring.

- Mixed feeding often occurs because women are not able to comply with safe feeding choices.
- Systematic problems with formula provision, including formula stock outs, force women to mix feed.

Challenges at facility level

The above-mentioned challenges manifest at the facility level in the following ways:

- Midwives are not responsible for establishing the HIV status of clients at antenatal care visits. Counselling of pregnant women is often seen as the responsibility of the lay counsellor. Many midwives do not see it as their responsibility to encourage pregnant women to know their status.
- Not enough women opt-in for testing and as a result many HIV-infected pregnant women are missed at entry point. Opt-in counselling services require women to choose to undergo VCT. Many women choose not to opt-in as they fear the opting-in process will identify them as being HIV-positive.
- The Comprehensive Plan makes pregnant women with CD4 counts below 200 eligible for HAART. However, at most antenatal clinics, ART eligibility criteria are not well established, pregnant women are not staged and not referred during antenatal care or after delivery for monitoring.

- During well baby visits, or immunization visits, nurses do not take responsibility for establishing the HIV status of the mother or infant. This results in too few infants receiving cotrimoxazole, and lack of follow-up of HIV-exposed infants.
- Limited participation of mothers in infant feeding decisions immediately after birth results in mixed feeding practices, and increased transmission rates.

PMTCT in Botswana – a comparative example

In order to address some of these challenges, an examination of the Botswana PMTCT programme offers an example as to how some challenges can be overcome and vertical transmission can be minimized.

Botswana's 2003 surveillance data showed that 37.4% of women attending antenatal clinics were HIV-infected.[4] In the absence of any interventions, 30% of infants born to HIV-positive mothers would become infected during pregnancy, delivery and breastfeeding. In 2001, Botswana implemented a national PMTCT programme and an expanding antiretroviral programme in 2002. The implementation of these programmes ensured that all pregnant women could receive HIV counselling and testing. By 2004, PMTCT services were established in all public facilities, i.e. all hospitals, antenatal clinics and delivery sites offered a full package of PMTCT services.

At the inception of the programme, HIV testing was conducted after pre-test counselling with pregnant women who actively chose to be tested. However, in 2003, two years after initiation of the programme, uptake rates were still low, with only 52% of pregnant women receiving antenatal care learning their HIV status.[5]

In 2004, in order to increase uptake and ensure that people needing ART could assess services, Botswana began to implement routine, compulsory (opt-out) HIV screening in antenatal care and other health

[4] Shaffer N, McConnel M, Bolu O, Mbori-Ngacha D, Creek T, Numy R et al. Prevention of mother-to-child HIV transmission internationally {conference summary}. Emerg Infect Dis November 2004

[5] Introduction of Routine HIV testing in prenatal care - Botswana, 2004 MMWR Weekly, November 26, 2004/53(46);1083-1086

settings. This increased uptake dramatically and the current uptake of PMTCT services is around 92%.[5] This has had a significant impact on the identification of HIV-positive pregnant women at entry point into the PMTCT programme, as well as on the number of eligible women being referred to treatment programmes.

It is important to note, that the introduction of routine testing did not lead to reductions in the number of women attending antenatal care. The current protocol for PMTCT is zidovudine (AZT) from 28 weeks to the mother and nevirapine at the onset of labour and 4 weeks of AZT to the infant. Recent reports indicate that vertical transmission rates are below 6.7%.[6]

Recommendations to strengthen PMTCT service delivery

Based on the Botswana example, the following recommendations can be made to strengthen PMTCT service delivery:

Antenatal care

Provinces should take ownership of the programme at the provincial level. There needs to be a more decentralized and participatory rapid appraisal process at the provincial level. This needs to be done with an integration lens by setting up provincial task teams to identify gaps in service delivery (provincial peer-to-peer model) and to make strategic, relevant and specific recommendations to the national and provincial plans of action that will specifically address improving the quality of care. In addition, it is necessary to re-examine the actual roles and tasks of midwives with respect to antenatal care so that antenatal tasks can be reorganized to ensure that midwives make HIV in pregnancy a priority.

It is essential that uptake of PMTCT is increased. This can be achieved through an opt-out approach whereby all women receive individual counselling and have to choose not to be tested. This would also play a role in the reduction of stigma and normalization of HIV testing and care for pregnant women. Evidence from Botswana, as well as the

[6] Creek Tracy, Early Infant Diagnosis of HIV using DNA PCR on dried blood spots in Botswana's national program for prevention of mother-to-child-transmission of HIV, Presentation at PEPFAR 2006 conference.

Western Cape and Witbank Hospital, has shown how the implementation of routine opt-out testing significantly affects PMTCT uptake and vertical transmission rates.

Post-test counselling for pregnant women who test HIV-negative during antenatal care needs to be strengthened to ensure that they remain negative and do not seroconvert during pregnancy or breastfeeding. In addition, both HIV-negative and HIV-positive women need to be encouraged to have their male partners tested.

The strengthening of linkages and referral networks between PMTCT and ART is essential. All pregnant women who test HIV-positive during antenatal care need to be staged at that time. To do this, CD4 testing of HIV-positive pregnant women should be conducted at the time when their status is determined. Pregnant women eligible for HAART should be fast-tracked into treatment programmes. This will result in a decrease in transmission rates and improve the well-being of the mother.

PMTCT needs to be integrated into all MCWH services, particularly family planning services. Women requesting family planning services should be encouraged to know their status and they should be provided with information about HIV and AIDS, as well as PMTCT. This would ensure that more women know their HIV status prior to becoming pregnant, and such information would empower HIV-positive women to make informed choices about fertility. Furthermore, these women can be referred to ART programmes.

Child healthcare

Healthcare workers need to improve the quality of infant feeding counselling, and assist mothers in making infant feeding choices that are appropriate to the their situation. In addition, women need to be supported to sustain their infant feeding choices after delivery and at every follow-up encounter that they have with the health system.

There is an urgent need to hold a technical infant feeding meeting to develop strategies to support maternal infant feeding choices. Strategies may include strengthening linkages with the national community health worker initiative, such that community health workers can conduct home visits and support mothers.

There is also a need to identify HIV-positive infants early. This can be done by linking early infant diagnosis with the six-week immunization visit. This will decrease loss to follow-up, and ensure that children needing ART are referred timeously. In order for this to happen, healthcare workers need to be able to identify HIV-exposed infants and ensure they receive the appropriate care, including administration of cotrimoxazole from six weeks.

Integration

The PMTCT programme needs to be integrated into routine MCWH services at the national, provincial, district and facility level. This will ensure strong linkages with family planning, ART programme, nutrition programmes, IMCI, immunization programmes, etc. The diagram below illustrates how reproductive health, child health and PMTCT can be integrated at the facility level.

Integrated Reproductive Health, Child Health and PMTCT

Pre-conception	Antenatal Care	Intrapartum Care	Postnatal/ Newborn Care	Child Care
For All Peripartum Women, Newborns, & Children				
•Counseling on prevention of HIV & STI (safer sex, partner involvement) •VCT and disclosure to partner •Family planning	•STI, including syphilis detection and treatment •Intermittent preventive treatment for malaria & insecticide treated nets •Tetanus toxoid •Micronutrients •Deworming •Testing and counseling for HIV (opt out) and disclosure to partner •Counseling on: ➢Infant feeding ➢Birth preparedness ➢Nutrition ➢Breast care ➢Family planning ➢Prevention of HIV & STI (safer sex, partner involvement)	***Woman:*** •Clean delivery (including prophylaxis and treatment for infection, e.g., chlorhexidine, antibiotic) •Minimize invasive procedures (artificial rupture of membrane, episiotomy) •Active management of the third stage of labor •Partograph •Emergency obstetric care •Universal precaution •Counseling & testing for HIV (if not done earlier) •***Newborn:*** •Resuscitation if necessary and minimize invasive suctioning •Prevention/management of newborn hypothermia/kangaroo care if LBW •Appropriate infant feeding •Prophylactic eye care	***Woman:*** •Identify/treat puerperal infections •Vitamin A •Counseling on: ➢Self-care (breast care, clean perineum, maternal nutrition) ➢Family planning/birth spacing and provide method ***Newborn:*** •Special care of LBW baby (warmth, prevent infections) •Detect/treat infections •Immunization •Growth monitoring •Counseling on basic newborn care (clean cord care, warmth, infant feeding, insecticide treated nets)	•Growth monitoring •Immunization •Detect/treat infections •Insecticide treated nets •Testing for HIV for symptomatic children •Counseling on: ➢Infant and child feeding ➢Hygiene •Link with IMCI
For HIV Infected Peripartum Women, Exposed Newborns, & Infected Children				
Woman: ARV prophylaxis, disease staging and ARV treatment for woman and partner when indicated, psycho-social support ***Exposed newborn***: ARV prophylaxis, early diagnosis, cotrimoxazole prophylaxis to prevent PCP ***Infected child***: Cotrimoxazole prophylaxis to prevent infections, disease staging, ARV treatment when indicated				

LINK TO COMMUNITY

Chapter 7

Early HIV Transmission, HIV-Free Survival and Infant Feeding Issues: findings from the Good Start Study

Introduction

Due to great difficulty in determining the effectiveness of the PMTCT programme from routine data, the Good Start Study was commissioned by the National Department of Health. This was a prospective cohort study that was designed to determine the operational effectiveness of the PMTCT programme under routine conditions. The follow-up of mothers and infants postpartum is one of the most challenging components of this programme and the Good Start Study was designed to track HIV-positive mothers and their infants from birth to nine months of age in order to measure infant feeding practices and HIV transmission. This is the first study to assess the effectiveness of the PMTCT programme under operational conditions.

Study aims and objectives

The primary aim of the study was to measure operational effectiveness of the South African National PMTCT Programme.

The objectives were to:

1. Measure the perinatal vertical HIV transmission rate at 3-4 weeks postpartum.
2. Measure the postnatal vertical HIV transmission rate at 36 weeks postpartum.
3. Measure HIV-free survival in infants at 36 weeks of age.
4. Examine infant feeding patterns in the context of HIV.

Research design

This was a prospective cohort study of mother-infant pairs participating in the national PMTCT programme in South Africa. Women (and their infants) were recruited prior to, or at the time of, delivery and followed until the infants were 36 weeks of age. HIV-positive mothers were recruited from the local hospital or clinic offering the PMTCT programme by a qualified field researcher. Recruitment over a period of 12 months yielded a total sample size of 665 mother-infant pairs as follows: Paarl 149, Rietvlei 192, and Umlazi 324. Overall loss to follow-up at 36 weeks was lower than expected at 21% and was not statistically different across sites, yielding a final sample of 525.

Study sites

The three study sites (Paarl, Rietvlei and Umlazi) were among the eighteen original national pilot sites and were purposely selected to reflect different socio-economic contexts, rural-urban locations and HIV prevalence rates. Paarl (Western Cape) is a peri-urban/rural area, with a relatively higher socio-economic profile, a relatively well functioning public health system and an antenatal HIV prevalence of 9% during the study period. Rietvlei (Eastern Cape) is a rural area in one of the poorest regions of South Africa with 28% antenatal HIV prevalence. Umlazi (KwaZulu-Natal), a peri-urban area with formal and informal housing, is considered to be intermediate with regard to health resources compared to the other two sites. The antenatal HIV prevalence was 47%.

Data collection

Data were collected from 1 October 2002 to 30 November 2004 by either trained field researchers (post-partum in the delivery facility and in the home at 3 weeks, to measure early feeding and HIV transmission; at 24 weeks, being the age by which breastfeeding should have been discontinued; and at 36 weeks which was the original PMTCT programme exit point) or trained community health workers (in the home at 5, 7, 9, 12, 16, 20, 28 and 32 weeks). Semi-structured interviews with the infant's mother or caregiver collected data on socio-demographics, infant feeding practices, infant and maternal morbidity, and disclosure of HIV status.

HIV viral load in mothers and the assessment of HIV infection in infants was obtained from dried blood spots collected on Guthrie cards by means of a heel/finger prick during home visits at 3, 24 (infants only) and 36 weeks. HIV infection in infants was determined by quantitative HIV-1 RNA NASBA (Nuclisens ECL, Biomerieux) and qualitative HIV-1 DNA PCR assay (Amplicor V.1.5, Roche). Children were defined as infected with HIV-1 if they had either a detectable viral load above 10 000 copies or were positive on DNA testing.

Results

Paarl demonstrated the best quality of PMTCT care, while many problems were seen with programme quality in Rietvlei (Table 1). Rietvlei was also the most socio-economically disadvantaged (Figure 1).

Table 1. Utilisation and quality of maternity care

	Paarl	Rietvlei	Umlazi	p-value
Mean number of antenatal visits (SD)	5.6 (2.5)	3.3 (1.2)	7.1 (3.2)	<0.0001
Four or more antenatal visits n (%)	106 (77.9%)	48 (29.1%)	235 (85.4%)	<0.000
Syphilis test performed	138 (98.6%)	48 (28.6%)	229 (82.7%)	<0.001
Emergency C/S	4 (2.9%)	21 (12.5%)	87 (31.4%)	<0.001
Elective C/S	9 (6.6%)	14 (8.4%)	40 (14.6%)	0.02
ROM > 4 hours	19 (13.6%)	3 (1.8%)	80 (28.9%)	<0.001
Delivery complications	29 (20.7%)	25 (14.9%)	183 (66.1%)	<0.001
Mother given NVP as per protocol	95 (67.9%)	45 (26.8%)	154 (55.6%)	<0.001
Mother given NVP out of time band	37 (26.4%)	67 (39.9%)	75 (27.1%)	<0.001
Mother not given NVP	8 (5.7%)	56 (33.3%)	48 (17.3)	<0.001
Infant NVP as per protocol	123 (87.9%)	121 (72.0%)	210 (75.8%)	<0.001
Infant NVP out of time band	10 (7.1%)	18 (10.7%)	47 (17.0%)	<0.001
Infant not given NVP	7 (5%)	29 (17.3%)	20 (7.2%)	<0.000
NVP n (%) mother and baby	126 (90.0%)	94 (56.0%)	214 (77.3%)	<0.001
Baby only	7 (5%)	45 (26.8%)	43 (15.5%)	<0.001
Mother only	6 (4.3%)	18 (10.7%)	15 (5.4 %)	<0.001
Neither	1 (0.7%)	11 (6.5%)	5 (1.8%)	<0.001
Cotrimoxazole given to infant	94 (79.0%)	40 (35.7%)	72 (32.9%)	<0.001

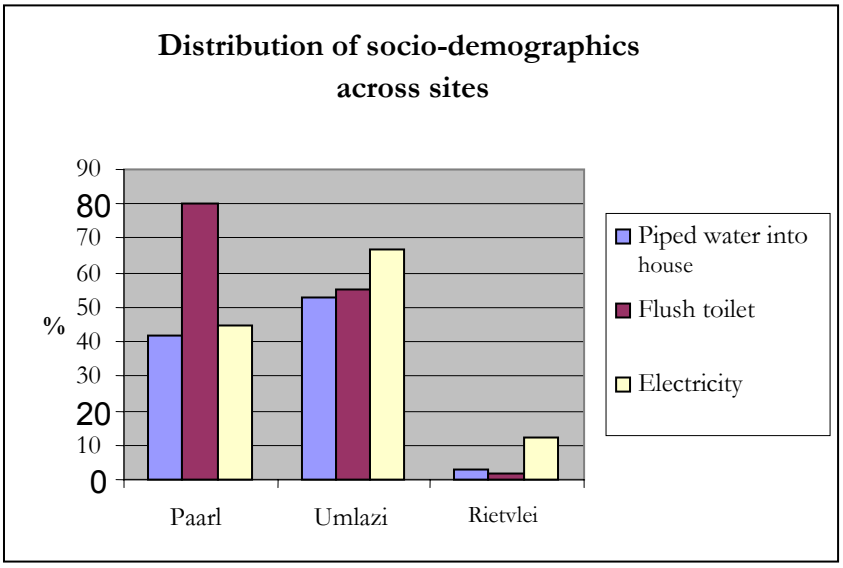


Figure 1

Early perinatal transmission

In reducing early HIV transmission, the PMTCT programme has been a success across all three sites. The early transmission rate (3-4 weeks) of 8.6% in Paarl, 13.7% in Rietvlei and 11.9% in Umlazi is similar to the 11.9% 6-week transmission rate found in the HIVNET012 study (Figure 2). This is an indication that peri-partum NVP prophylaxis is effective under operational programme conditions.

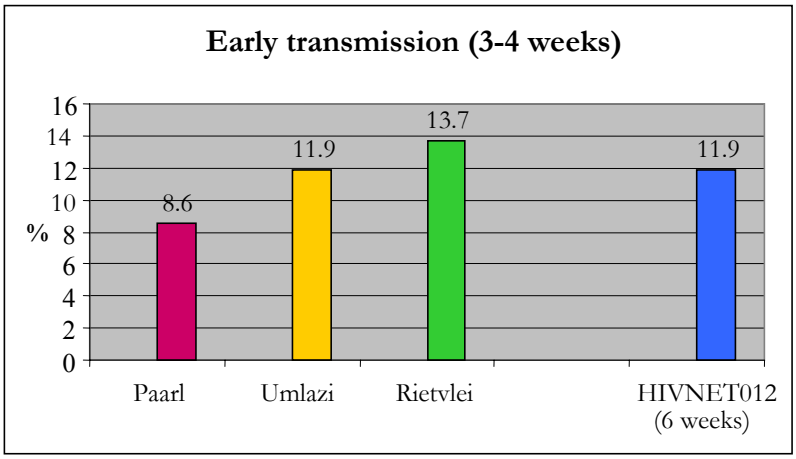


Figure 2

Although there were differences between sites in the distribution of risk factors, the differences in early transmission were not statistically significant. Some of the difference across the sites could be explained by differences in quality of antenatal care and receiving nevirapine within the correct time period:

- Attending antenatal care three or fewer times was significantly associated with early transmission and there was a significant difference across sites ($p<0.01$).
- Low birth weight and maternal viral load were also statistically significant predictors of early transmission.
- There were significant differences across sites with regard to the mother not taking nevirapine according to the protocol: 6.7% in Paarl vs. 31.1% in Rietvlei and 18.8% in Umlazi. This finding indicates that there is still considerable room for improvement in reducing early transmission.

Late postnatal transmission

The proportion of HIV infections occurring postnatally is increasing as intrapartum regimens improve. Minimising postnatal transmission is therefore a major challenge in increasing infant survival.

There are well established risks to not breastfeeding under unsafe conditions which means that making the correct infant feeding choice is extremely important for HIV-positive mothers. Global recommendations have been developed to guide health workers in

counselling women on infant feeding options. WHO/UNICEF recommend *"avoidance of all breastfeeding if replacement feeding is acceptable, feasible, affordable, sustainable and safe. Otherwise exclusive breastfeeding for the first months of life is recommended followed by early breastfeeding cessation as soon as feasible, when conditions for safe replacement feeding can be met."*

Late transmission of HIV in this study was defined as an infant who was HIV-negative at 3 weeks but who tested HIV-positive at 24 or 36 weeks postpartum. Breast milk is the most important exposure leading to late postnatal HIV transmission. In this study, infants of HIV-positive mothers who had been given breast milk were 2.02 (95% CI: 1.03-3.96) times more likely to have late transmission than those who reported no exposure (pooled analysis across all three sites). 'Ever Breastfed' however only measures exposure to HIV postpartum, and does not address outcomes that occur within different feeding patterns.

There were large differences in the infant feeding intentions of mothers in the three sites (Figure 3) and evidence of inappropriate feeding choices, with only a third of women who chose to formula feed having piped water, a sustainable source of cooking fuel and having disclosed their HIV status.

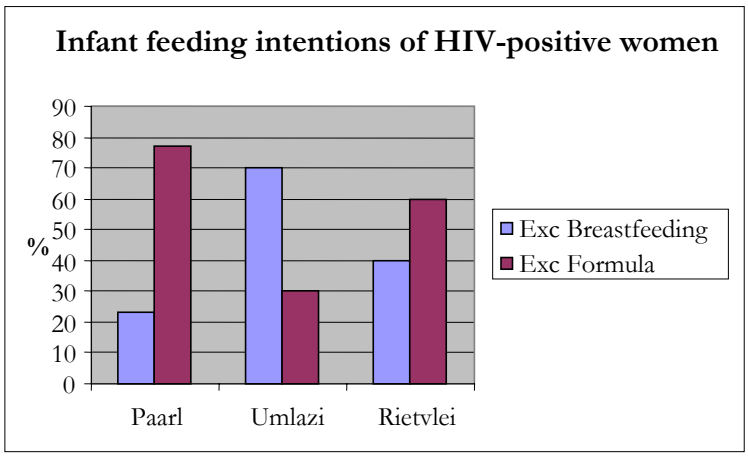


Figure 3

Overall, 60% of mothers were able to maintain their initial feeding choice in Paarl compared with only 39.3% and 23.8% in Rietvlei and Umlazi respectively. Across the three sites less than a quarter of women who intended to practice exclusive breastfeeding were adhering to this practice at 12 weeks postpartum. In Umlazi and Rietvlei

approximately half of the women who intended to exclusively formula feed were able to do this at 12 weeks. The rate of exclusive formula feeding was considerably higher in Paarl (83.2%) compared with the other two sites. Across all sites, a significantly higher proportion of women were able to maintain exclusive formula feeding than were able to maintain exclusive breast feeding.

A late transmission rate of 7.8% in Paarl, 19.2% in Rietvlei and 12.3% in Umlazi was found (Figure 4). The rates in Rietvlei and Umlazi are considerably higher than the 36 week rate found in the BHITS meta-analysis of MTCT trials in breastfeeding populations of 6.0%. The large differences in late transmission between these sites are largely due to differences in the methods of infant feeding.

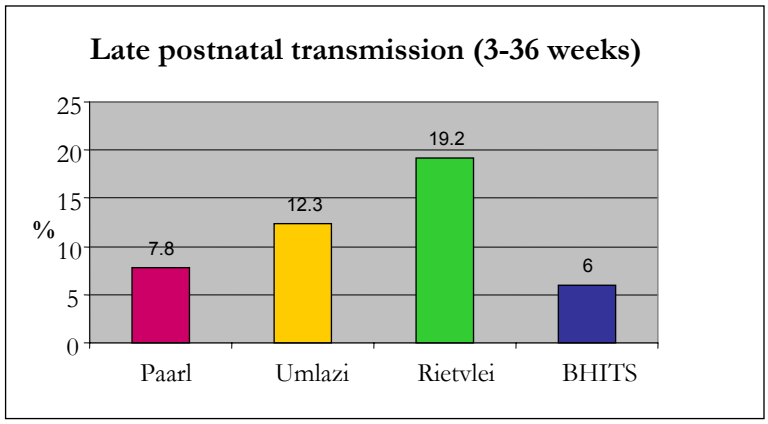


Figure 4

Infant mortality and HIV-free survival

The difference in outcomes between sites becomes even starker once HIV infection or death at nine months is used as the main outcome measure. Overall 75 (8.5%) infants died between birth and 36 weeks of age across the three study sites (Figure 5). Sixty-seven of these infants were born to HIV-positive mothers and eight to HIV-negative mothers for 36 week infant mortality rates of 10% and 4%. (RR 2.75, p=0.003, 95% CI: 1.34 to 5.62). There were significantly more deaths at Rietvlei compared to other two sites: 15.0% vs. 5.7% (RR 2.65, p=000005, 95% CI 1.72 to 4.08). The majority of the infants (>80%) died before 24 weeks (6 months) of age.

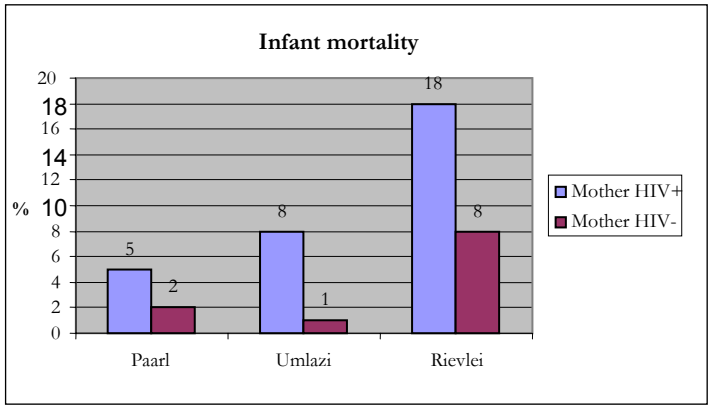


Figure 5

Using HIV-free survival (alive and HIV-negative) as the ultimate measure of effectiveness of PMTCT, rates at 36 weeks of 84% in Paarl, 64% in Rietvlei and 74% in Umlazi were found. Comparing this to recent clinical studies of PMTCT treatment programmes, Paarl is achieving results comparable to clinical trial studies, while Umlazi is somewhat higher and Rietvlei is similar to the placebo (untreated) group in the PETRA study.

The two strongest risk factors for infant death were infants testing HIV-positive at three weeks of age and maternal log viral load. Other factors that predicted infant death were socio-economic score, low birth weight and three or fewer antenatal visits. Interestingly 'Ever Breastfed' was not a predictor of infant death.

The following factors were associated with HIV transmission or death by 36 weeks: maternal log viral load, socioeconomic score, low birth weight, premature birth, antepartum syphilis testing and three or fewer antenatal visits. 'Ever Breastfed' however was not predictive of HIV transmission or infant death combined.

Conclusions

The findings from this study confirm that PMTCT programmes are effective in reducing perinatal HIV transmission in operational settings. The reductions in early transmission are encouraging and could be further improved with access to dual or triple antiretroviral regimens which are now being introduced across the country.

Some of the gains from the reductions in early transmission are lost due to postnatal transmission through breast milk. In addition greater mortality was attributed to poorer socio-economic environments and inadequate maternal and child health services. The high late postnatal transmission found in two of the sites, with corresponding high rates of mixed feeding and poor postnatal care, highlight the need for greater support for women both at the facility and the community level, to adhere to exclusive infant feeding practices.

The ultimate effectiveness of this programme must be measured through HIV-free survival. The low HIV-free survival in Rietvlei suggests that reducing HIV-transmission alone is not sufficient without broader health systems improvements to prevent the common causes of infant deaths.

Recommendations

Early perinatal transmission

- Consideration should be given to the use of dual therapy for PMTCT. This has already been introduced at the Paarl site and could contribute to further reductions in perinatal transmission and potentially greater antiretroviral coverage due to the simpler daily administration, rather than administration at the onset of labour, which is sometimes difficult to discern.

- Greater efforts are needed to enable pregnant women, who meet the criteria, to access HAART to further reduce in utero and intrapartum transmission. The impact of HAART on breast milk transmission is not currently known but could potentially make breastfeeding for HIV-positive women a safer option.

- Health systems factors that may limit access to antenatal care, uptake of nevirapine, and result in sub-optimal labour and delivery practices should be addressed through training of health workers and improved counselling of mothers.

Late postnatal transmission

- Greater support for women to adhere to infant feeding choices is needed. This includes more frequent and comprehensive counselling as well as ongoing postnatal support at facility and community levels.

- The PMTCT programme needs to integrate more closely with other maternal and child health programmes.

Infant mortality and HIV-free survival

- Increased technical assistance, staffing and funding per woman served will likely be needed in poorly resourced districts to assure success of the PMTCT programme.

- In-depth reviews of the quality of all PMTCT programmes are needed to provide guidance for the necessary adjustments required in national and provincial funding allocations to assure PMTCT programme success in all districts.

Chapter 8

The Paediatric ARV Rollout: a KwaZulu-Natal Experience

Current scenario

KwaZulu-Natal, with the highest HIV antenatal sero-prevalence rate, began the rollout of antiretrovirals in July 2004. Fifty-five sites were initially accredited for starting adults and children on antiretroviral treatment (ART). There was an adult focus at most sites in the first six months with few or no children being enrolled. Most sites had less than a 10% paediatric component by the end of March 2005. Targets specific to children were set for each district and site. Most sites did not meet these targets although a pattern did emerge at those sites where targets were met. These sites had established paediatric HIV services prior to the rollout and also had specific clinicians 'driving' the paediatric rollout.

The second goal of the ART programme is to strengthen the country's national health system, and consequently a step-by-step programme was developed with huge resources being allocated to upgrade facilities and recruit staff. A cumbersome human resource system and lack of management capacity at sites hampered effective utilization of allocated funds, the appointment of new staff, and the expansion and development of the entire ART programme.

Standardized paediatric guidelines for KwaZulu-Natal were developed and distributed. The paediatric and adult ART programme remained very hospital outpatient-based with little involvement or down-referral

to the primary healthcare clinics. Most physicians dispensing antiretrovirals were adult-based.

The following year, 2005-2006, saw more sites accredited and the province had 3 932 children on treatment by the end of March 2006, accounting for 10.8% of the total number of persons on treatment. Training of doctors in paediatric dispensing became a priority. While improvements have occurred much still needs to be done.

Although monitoring and evaluation systems were piloted, individual sites began to develop their own user-friendly systems. A centralized data capturing system was in operation, but quality and validity of data remained a problem. Social workers, dieticians and data capturers were appointed, with severe shortages of pharmacists being the most common factor delaying the scale -up of children's treatment.

Area 1	Site	Paediatric department	Level of site	No. children on ART	% paediatric on ART
Addington	urban	yes	district	52	8
Clairwood	urban	yes	district	0	0
King Edward	urban	yes	tertiary	416	29
King George V	urban	no	regional	4	4
Osindisweni	rural	no	district	29	11
Prince Mshyeni	urban	yes	regional	225	28
RK Khan	urban	yes	regional	18	1
GJ Crookes	rural	no	district	46	8,1
Murchison	rural	no	district	29	5
St Andrew's	rural	no	district	19	7
Port Shepstone	urban	yes	regional	41	5
Stanger	urban	yes	regional	331	20
Umphumulo	rural	no	district	11	4
Untunjumbili	rural	no	district	5	10
Montebello	rural	no	district	25	7
Area 2					
Grey's	urban	yes	tertiary	151	10
Edendale	urban	yes	regional	580	34
Northdale	urban	no	district	167	23
Appelsbosch	rural	no	district	26	9
Emmaus	rural	no	district	34	9
Estcourt	urban	no	district	46	5
Ladysmith	urban	yes	regional	179	12
Utrecht	rural	no	district	0	0
Newcastle	urban	yes	regional	55	11
Madadaeni	urban	yes	regional	101	9
Nqutu	rural	no	district	52	8
Tugela Ferry	rural	no	district	117	12
Dundee	urban	no	district	71	7
Greytown	rural	no	district	47	9
Ixopo	rural	no	district	34	6
Creighton	rural	no	district	47	9
EG Usher	rural	no	district	68	13
Tayler Bequest	rural	no	district	22	9

Area 3					
Benedictine	rural	no	district	40	5
Ceza	rural	no	district	7	6
Isthelejuba	rural	no	district	4	3
Nkonjeni	rural	no	district	33	7
Ngwelezana	urban	yes	regional	259	14
Eshowe	urban	no	district	68	13
Catherine Booth	rural	no	district	11	4
Nkandla	rural	no	district	21	4
Lower Umfolozi	urban	no	regional	0	0
Ubonolwane	rural	no	district	0	0
Ekhombe	rural	no	district	0	0
St Mary's	rural	no	district	20	6,6
Bethesda	rural	no	district	29	5,2
Hlabisa	rural	no	district	78	8,5
Manguzi	rural	no	district	56	6
Mosvold	rural	no	district	94	12
Mseleni	rural	no	district	78	9
Total				**3932**	**10,75**

Table 1: Hospital sites accredited for ART rollout and number of children on ART (31 March 2006)

Monitoring and evaluation

The burden of HIV disease in KwaZulu-Natal remains immense. PMTCT programmes have not decreased the number of infected new-born infants. Rapid expansion of the rollout to children is needed. Proper evaluation of the current programme as well as monitoring on an ongoing basis is vital. Under-5 mortality statistics from the province are a very important part of this information loop.

Determining the number of children dying who are HIV-infected forms the basis of much of this data. However, with the analysis of deaths, looking at eligibility for ART of those dying is vital. It is expected that findings will show that a large number of children that died were in fact eligible for ART and this should help galvanize services and resources to further scale-up paediatric ART. This will also enable project managers and physicians to determine entry barriers to the ART programme.

Entry barriers include the repeated number of visits caregivers and patients need to make for identification and assessment of eligibility. However, what has been noted in most facilities is the failure to utilize inpatient hospital stays and outpatient visits as points at which the process of identification and preparation for ART can be done. The

lack of counsellors and failure to manage counsellors at institutions efficiently results in inordinate delays for voluntary counselling and testing (VCT) and adherence training. In the current process counsellors remain the gatekeepers to programme entry.

There have been improvements in turnaround time for PCR and CD4 results but these times need to be drastically shortened. The feedback of results to sites is the longest arm of the loop.

Another important factor is the failure of many physicians to stage children who are clinically HIV-infected or proven to be HIV-positive. The Child PIP process has shown this across the sites. Failure to stage children means a significant opportunity is lost for, and therefore delays, commencing ART. The information gathered from Child PIP is thus being used and can further be effectively used to help expand these needed services.

While expansion plans need to be acted upon, the current process needs consolidation. This is particularly true in the field of monitoring and evaluation. At present piecemeal monitoring systems are in place and coordination of these systems is needed.

Three additional questions have arisen with the rollout:

1. What are the complication rates among children on ART. Are children dying following treatment failure?
2. Are children dying because of adverse drug reactions?
3. Is the Immune Reactivation Syndrome (IRS) cause for concern?

Child PIP needs to incorporate these new parameters. Mortality data from children who are on ART is vital in the assessment of the entire comprehensive package of care.

The KwaZulu-Natal paediatric ART programme does represent many of the challenges that are inherent in our transforming health department. Analyzing mortality data remains one of the cornerstones in determining the extent to which this intervention is making a difference in the HIV pandemic ravaging the children of KwaZulu-Natal.

PART FOUR: SITE REPORTS

Each site using the Child PIP mortality review process during 2005 submitted a report describing their experience. Some sites began implementing the programme during the year and hence not all reports cover the full 12 months.

Baseline data were collected from the monthly tally sheets. As some sites had difficulties collecting this data, the number of deaths recorded in the baseline data does not always correlate exactly with the number of deaths audited. The vast majority of the analyses use the audited deaths. The total number of modifiable factors listed in the baseline data is often slightly different from the total used in the analysis of quality of care. The effect of these differences is small. These problems will be resolved with the further development of Child PIP.

Gauteng

Coronation Hospital

Introduction

Coronation Hospital is situated in Newclare, a suburb of Johannesburg. It is a regional hospital providing primary, secondary and some tertiary level care. Coronation Hospital is attached to the University of the Witwatersrand and serves as a teaching hospital for both undergraduate and postgraduate medical students. The hospital has primarily paediatric, obstetric and gynaecology services with a busy paediatric outpatient department and a polyclinic for adults. All adult services apart from obstetrics and gynaecology are referred to Helen Joseph Hospital which is situated 2 km away.

Due to the complexity of the referral setup of Coronation Hospital, it is difficult to estimate the population that the hospital serves.

Coronation Hospital serves as a walk-in centre for patients in the surrounding areas. Due to the poor infrastructure of primary healthcare clinics in the area, many problems are attended to at the busy paediatric outpatient department (POPD). It is a referral centre to three regional hospitals i.e. Leratong Hospital, Yusuf Dadoo Hospital and Carltonville Hospital. Coronation Hospital is also the referral hospital to Diepsloot, a large, ever growing informal settlement situated north of Johannesburg. Together with Johannesburg General Hospital, Coronation Hospital is also the referral centre for Alexandra Clinic, a large primary level facility serving Alexandra Township, one of Gauteng's oldest and poorest areas.

The population demographics of patients at Coronation Hospital range from urban to peri-urban. The majority of patients are in the low-income bracket with a large percentage of patients coming from informal settlements.

The paediatric department is staffed by 9 full-time paediatricians, 7 paediatric registrars, 11 medical officers/interns and a further 3 full-time medical officers in outpatients. The department has 4 paediatric wards in total, with a total bed capacity of 100: 2 general paediatric wards, a combined paediatric and orthopaedic ward and a combined admission/isolation/gastroenteritis ward.

The neonatal unit comprises 30 beds but usually accommodates 40 patients. A 5-bedded neonatal ICU is adjacent to the neonatal unit. While the ICU is predominantly a neonatal unit, it also accommodates patients from the general wards. The maternity department delivers more than 10 000 babies per year.

Coronation Hospital is also fortunate to have an enthusiastic, energetic HIV rollout team consisting of a paediatrician and three medical officers. By the end of December 2005, 500 children were receiving ART. Consultants and registrars from the general paediatric wards assist the team. A PMTCT programme at Coronation Hospital is well established with a good coverage rate, but could be improved upon. Almost all HIV-positive mothers opt for exclusive formula feeding and an HIV PCR is done on infants at six weeks at the PMTCT clinic.

Methods

Child PIP was initiated on 1 July 2005 at Coronation Hospital. Staff report on all medical patients that are admitted to the wards. This includes patients admitted as short stay cases. The surgical patients (orthopaedic, ear, nose and throat, dental) are not included in the data. A statistics form is completed on intake. The form includes demographic data, anthropometrics, diagnosis and HIV status. Medical officers then enter data into a Microsoft Access Database. This allows quick and accurate gathering of statistical data.

On the death of a child, the registrar in charge of the patient or if after hours, the registrar on call will complete the Child PIP form and prepare a summary of the death.

Audit meetings are held twice a month. The first meeting is held on the first Tuesday of the month. Registrars present ward statistics and deaths are discussed. Consultants, registrars and medical officers attend the meetings. Attendance by nursing staff is sparse.

Although these meetings took place before the advent of Child PIP, they are now more structured. One obstacle that staff has not managed to solve yet is the availability of patient's records at the meetings as the mortuary staff are not prepared to part with files until the bodies have been collected.

Results

Baseline data

A total of 1 942 medical patients was admitted in the six-month period from July to December 2005. There were 81 deaths giving a case fatality rate of 4.2%.

Coronation Hospital	*July - December 2005*
Total admissions	1942
Total deaths	81
Case fatality rate (%)	4.2
Total modifiable factors	193
Modifiable factor rate (per death)	2.38

Information about children who died

Demographics

The one-month to one-year-old group accounted for the highest proportion of deaths. Deaths in children under-5 accounted for 91.3% of all paediatric deaths at Coronation Hospital.

Age	***Jul – Dec 2005 (% of all deaths)***
0-1 month	1.3
1 month-1 year	63.7
1-5 years	26.3
5-13 years	6.3
13-18 years	2.5
Total	100

Social context

Mother's wellbeing	***Jul – Dec 2005 (% of all deaths)***
Alive and well	78.8
Dead	3.8
Sick	8.8
Unknown	6.3
Total	100

Health context

NUTRITION

Poor nutrition was a co-morbid feature in 70% of deaths.

Weight	***Jul – Dec 2005 (% of all deaths)***
Normal	23.8
UWFA	35.0
Severe malnutrition	35.0
Total	100

HIV/AIDS

Below are tables pertaining to HIV at Coronation Hospital.

Laboratory category	***Jul – Dec 2005 (% of all deaths)***
Negative	15.0
Exposed	8.8
Infected	63.7
Not tested (but indicated)	7.5
Not tested (not indicated)	5.0
Total	100
Clinical HIV staging	***Jul – Dec 2005 (% of all deaths)***
Stage I	1.3
Stage II	6.3
Stage III	20.0
Stage IV	41.3
Not staged/Unknown	31.1
Total	100

PMTCT

Laboratory category	NVP given	NVP not given	Mother negative	Unknown	**Total**
Negative	1	2	8	1	12
Exposed	2	4	0	1	7
Infected	10	22	1	18	51
Not tested	1	1	2	6	10
Total	14	29	11	26	80

The following table compares laboratory HIV status with weight category for all deaths.

Nutrition / *Laboratory*	Normal	UWFA	Marasmus	Kwash	M – K	Unknown	**Total**
Negative	3	6	2	1	0	0	12
Exposed	3	3	1	0	0	0	7
Infected	11	17	18	3	0	2	51
Not tested (indicated)	1	1	2	0	1	1	6
Not tested (not indicated)	1	1	0	0	0	2	4
Total	19	28	23	4	1	5	80

Inpatient mortality

The case fatality rates for July to December 2005 according to various parameters are tabulated below.

	Admissions (no.)	*Deaths (no.)*	*Case fatality rate (%)*
All admissions	1942	80	4.1
0-1 month	188	1	0.5
1-12 months	812	51	6.4
1-5 years	636	21	3.3
5-13 years	284	5	1.8
13-18 years	22	2	9.1
Under-5 admissions	1636	73	4.5
Nutritional status:			
< 3rd centile	384	39	10.2
Illness:			
ARI	431	29	6.7
DD	391	16	4.1

The total CFR for all admissions was 4.1% with an under-5 CFR of 4.5%. Of note was a particularly high CFR in the 13-18 year age group. The cut-off age for paediatrics at Coronation Hospital is 14 years and hence this group only consists of children between 13 and 14 years. The sample size was quite small and the result is probably a statistical anomaly. The next highest CFR was in the one-month to one-year age group.

Of particular concern was the high incidence of undernourished children and the high associated CFR (10.2%).

Causes of child deaths

Main diagnosis	*Jul – Dec 2005 (% of all deaths)*
Septicaemia, possible serious bacterial information	26.3
PCP (suspected)	16.3
Acute diarrhoea, hypovolaemic shock	15.0
Pneumonia, ARI	10.0
Meningitis: bacterial	5.0
Chronic diarrhoea	3.8
Inhalation of foreign body or gastric content	3.8
TB: Miliary, other extra pulmonary	2.5
Other (specify)	2.5
Status epilepticus	2.5
Surgical (Appendix, hernia, intestines, peritoneum)	1.3
TB: Meningitis	1.3
other respiratory failure (specify)	1.3
Other serious infection (specify)	1.3
Cirrhosis, portal hypertension, liver failure, hepatitis	1.3
Hypoglycaemia	1.3
Ill-defined/ unknown causes of mortality	1.3
Meningitis: Viral (meningo-encephalitis)	1.3
Non acid injury, abuse related, neglect	1.3
Anaemia	1.3

All diagnoses: top 5	*Jul – Dec 2005 (% of all diagnoses)*
Septicaemia, possible serious bacterial information	21.0
Pneumonia, ARI	11.6
Acute diarrhoea, hypovolaemic shock	11.6
PCP (suspected)	10.1
Inhalation of foreign body or gastric content	5.8

Information about quality of child healthcare

Records	*Jul – Dec 2005 (% of all deaths)*
Folder not available	6.3
Folder available: incomplete and/or inadequate	7.5
Folder available: OK	73.8
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*Jul - Dec 2005 (% of MFs)*
Home	50
Primary health clinic	15
Admission & Emergency care	7
Ward	23
Other	5
Total	100

Modifiable factors: who?	*Jul - Dec 2005 (% of MFs)*
Caregiver and family	52
Administrator	12
Clinical personnel	38
Total	100

Discussion

About children who died

In the 6 month period ranging from July 2005 to December 2005 there were 1 942 admissions to the medical wards.

SOCIAL CONTEXT

Seventy-nine percent of mothers were well and 9% were sick. Coronation Hospital staff tries to treat both mother and child. An HIV Elisa test (if their status is not known) and a CD4 count are offered to all mothers of HIV-positive children. Mothers with low CD4 counts are referred to the adult ART rollout clinic at Helen Joseph Hospital. Getting fathers involved in the programme is one area that could be improved

HEALTH CONTEXT

One of the largest challenges facing health workers country-wide is the HIV pandemic. Sixty-four percent of children who died were HIV-infected, with a further 9% having been HIV-exposed. HIV-infected children are frequently malnourished. Of all the children who died, 70% (56) were undernourished. Of these, 75% (42) were either HIV-infected or HIV-exposed.

INPATIENT MORTALITY

There were 80 deaths in this period giving a case fatality rate of 4.2%. Of the 80 deaths, 65% were in children under 1 year of age and a further 26% in children aged between 1 and 5 years. Under-5 deaths accounted for 91% (73) of all childhood deaths. The case fatality rate for under-5 children was 4.5%. These figures indicate that younger children are at a higher risk of dying, and substantiate data from the Saving Children 2004 report gathered from the eight pilot sites. Acute respiratory illness accounted for 26% of the 1 636 under-5 admissions and diarrhoeal diseases accounted for 24%. The CFRs were 6.7% and 4.1% respectively.

CAUSES OF DEATH

Septicaemia was the commonest cause of death accounting for 26% of all deaths. Suspected PCP was the second commonest (16%) followed by acute diarrhoea (15%), pneumonia (10%) and meningitis (5%). While it may be surprising that septicaemia is the commonest cause of death, one must note that sepsis may present as either ARI or diarrhoeal disease. Further, children with HIV are more prone to developing sepsis. Almost all children admitted to the wards with HIV, pneumonia and gastroenteritis have a routine blood culture which results in a high pick up rate for septicaemia.

The high rate of PCP is alarming because this signifies a failure of PMTCT and cotrimoxazole prophylaxis. Although Coronation Hospital's PMTCT programme is considered to be good, there is still room for improvement. One major problem is that many mothers do antenatal booking at local clinics or other facilities where PMTCT is less of a priority. There is also no clear way of identifying HIV-positive mothers from their antenatal cards as many clinics have their own coding system that is not familiar to staff members. Many HIV-positive mothers do not disclose their HIV status at delivery. Nevirapine was not appropriately given in 36% of deaths and information was unknown or missing in 33% of cases.

Acute gastroenteritis accounted for 15% of deaths, making it the third commonest cause of death at Coronation Hospital. While management in the hospital setting seems to be adequate, many of these deaths could have been avoided with adequate home management and early recognition of danger signs.

Acute lower respiratory tract infection accounted for 10% of deaths. Of these cases, 90% were HIV-infected or HIV-exposed. HIV-exposed and HIV-infected children with pneumonia are unlikely to be accepted into ICU.

About quality of child healthcare

Registrars and medical officers completed the Child PIP forms with enthusiasm. Record-keeping was good and every effort was made to track missing folders. Folders were deemed 'OK' in 74% of cases.

A total of 172 modifiable factors were identified with a modifiable factor rate of 2.15 per death. Home circumstances accounted for 50% of all modifiable factors. Common factors included caregivers not realising the severity of illness, delay in seeking care and poor compliance. Better public education is required regarding basic management of illnesses like acute gastroenteritis. The public should also be able to recognise danger signs and seek help timeously. Better IMCI implementation could greatly assist in this regard.

Factors identified at the clinics included delay in referring patients timeously, delay in referring children with failure to thrive and inadequate assessment on patients. Again, these factors could be reduced by correct implementation of IMCI at clinics.

There were few modifiable factors relating to emergency management of patients. This was probably due to the close proximity of the paediatric admission ward to casualty and any critically ill child was either immediately rushed to the admission ward or the paediatric registrar called to casualty.

Inpatient management accounted for 23% of all modifiable factors. The factors are diverse but include communication issues, inadequate assessment of patients, lack of monitoring equipment and lack of appropriate antibiotics. Individual problems have been attended to on an individual basis.

Conclusion

Coronation Hospital is a relative newcomer to Child PIP. The staff has coped well with the initiation process and Child PIP has become part of the routine. Mortality meetings have become more structured. The next challenge is to complete the audit loop. Coronation Hospital has done the audit, identified some problems and now needs to try to find long-term solutions.

Kalafong Hospital

Introduction

Kalafong Hospital is situated in Atteridgeville, a township west of Pretoria in Gauteng. The township consists of a mixture of formal and informal settlements, and most patients are of low socio-economic status with a few from the middle class. Kalafong Hospital is a regional hospital that provides primary, secondary and some tertiary services, and it serves as a referral centre for a number of regional hospitals in Mpumalanga province. It has a teaching responsibility for both undergraduate and postgraduate medical students of University of Pretoria.

The paediatric department is responsible for the following wards: a high care neonatal unit, ICU, KMC, oncology, general paediatric medical ward, and hospice for AIDS children. An outpatient department provides emergency care, general outpatient and specialist clinic care. The paediatric department consists of 14 fulltime registrars/medical officers and 8 paediatricians.

Methods

Every Friday the paediatric department holds a morbidity and mortality meeting where patients who died, and those that are difficult to manage are discussed. All the files of the patients who died are reviewed. After a death, the registrar/medical officer completes the child death data capture sheet and at the meeting the final diagnosis and modifiable factors are finalised.

Results

Baseline data

Kalafong Hospital	*2004*	*2005*
Total admissions	3927	3261
Total deaths	134	132
Case fatality rate (%)	3.4	4.0
Total modifiable factors	92	154
Modifiable factor rate (per death)	0.68	1.2

Information about children who died

Demographics

Age	*2005 (% of all deaths)*
0-1 month	2.3
1 month-1 year	67.4
1-5 years	18.2
5-13 years	9.8
13-18 years	2.3
Total	**100**

Social context

Primary caregiver	*2004 (% of all deaths)*	*2005 (% of all deaths)*
Mother	[1]	68.9
Grandmother	[1]	3.8
Other	[1]	18.2
Unknown	[1]	9.1
Total	100	100
Mother's wellbeing	***2004 (% of all deaths)***	***2005 (% of all deaths)***
Alive and well	59.8	65.9
Dead	2.2	2.3
Sick	6.0	3.8
Unknown	32.0	28.0
Total	100	100

[1] No data

Health context

NUTRITION Poor nutrition was a co-morbid feature in 65% of deaths.

Weight	*2004 (% of all deaths)*	*2005 (% of all deaths)*
Overweight		2.3
Normal	16.7	25.8
UWFA	34.8	38.6
Severe malnutrition	28.8	26.5
Unknown	19.7	6.8
Total	100	100

HIV /AIDS Below are tables pertaining to HIV at Kalafong Hospital.

Laboratory category	*2005 (% of all deaths)*
Negative	16.7
Exposed	15.2
Infected	41.7
Unknown	26.0
Total	100
Clinical HIV staging	*2005 (% of all deaths)*
Stage I	0.0
Stage II	3.8
Stage III	3.0
Stage IV	31.8
Not staged	51.5
Unknown	9.8
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*2005 (% of all deaths)*
NVP given	4.5
NVP not given	20.5
Mother negative	23.5
Unknown	51.3
Total	100

Fifty-seven percent of all deaths were associated with HIV. Only 7% of these were on antiretroviral treatment even though 52% were eligible for ART. The following obstacles to patients receiving ART at Kalafong Hospital included:

- TB co-infection and treatment (23%)
- Lack of human resources (21%)
- Social issues e.g. legal guardianship, maternal illness (19%)
- Incorrect staging (14%)

Eight (42%) out of 19 children who died of PCP pneumonia did not receive cotrimoxazole prophylaxis, in 4 (21%) cases the mother was negative during antenatal testing and information about the remaining cases was unknown. Thirty-one mothers tested negative on the PMTCT programme, and of these, there were 11 (35.5%) HIV-related child deaths (5 infected and 6 exposed), and only 17 children tested negative.

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
Pneumonia, ARI	15.2
Acute diarrhoea, hypovolaemic shock	13.6
Septicaemia, possible serious bacterial information	12.1
PCP (suspected or confirmed)	8.3
PCP (suspected)	6.1
Tumours, Leukaemias	6.1
Hospital-acquired infection	5.3
Ill-defined/ unknown causes of mortality	4.6
Meningitis: bacterial	4.6
Other (specify)	3.8
AIDS	2.3
Chronic diarrhoea	2.3
Cirrhosis, portal hypertension, liver failure, hepatitis	2.3
Heart failure, Pulmonary Oedema	2.3
TB: Meningitis	1.5
Other diagnosis (specify)	1.5
other respiratory failure (specify)	1.5
Cong. Heart disease, Cardiomyopathy	0.8
Acute renal failure	0.8
Surgical (Appendix, hernia, intestines, peritoneum)	0.8
Pneumothorax, Pyothorax, Pleural effusion	0.8
TB: Miliary, other extra pulmonary	0.8
Unknown	0.8

All diagnoses: top 5	*2005 (% of all diagnoses)*
ARI, including PCP	19.4
GE	11.2
Sepsis	9.0
PCP	6.8
Anaemia	5.8
Leukaemia	5.8

Information about quality of child healthcare

Records	*2005 (% all deaths)*
Folder not available	31.1
Folder available: incomplete and/or inadequate	64.5
Folder available: OK	62.9
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*2005 (% of MFs)*
Home	19.5
Primary health clinic	18.8
Admission & Emergency care	35.7
Ward	26.0
Total	100
Modifiable factors: who?	*2005 (% of MFs)*
Caregiver and family	19.5
Administrator	16.2
Clinical personnel	64.0
Total	100

The following table shows the number of cases where no modifiable factors (MFs) were identified compared to cases where they were, in terms of place where modifiable factors occurred.

	No MFs identified	*Insufficient information*	*Number of MFs (may be > 1 per case)*
Home	93	19	30
Primary health clinic	94	16	29
A & E care	97	7	55
Ward	76	26	40

Discussion

About children who died

HEALTH CONTEXT

Half of the deaths at Kalafong Hospital were associated with HIV and malnutrition. Even though ART is available, there are several obstacles to reaching many children. Kalafong Hospital has over 350 children on ART and these are not the ones dying or admitted for illnesses to the wards. This shows that ART is effective in reducing morbidity and mortality associated with HIV, yet there are a lot of children who need ART but are not accessing it. Many infants are still not receiving cotrimoxazole prophylaxis and many pregnant mothers are not testing during antenatal care.

CAUSES OF DEATH

The major causes of death were lower respiratory tract infections (LRTI), gastroenteritis and sepsis. There is not much difference in the profiles of deaths between 2004 and 2005. Even though ART is provided, there has not been a significant reduction in HIV-related death and illnesses because of a failure to reach the many children who need ART.

About quality of child healthcare

The reason for auditing is to find factors that can be modified to improve quality of care for children. Most of the modifiable factors

were personnel-related and they were equally shared among assessment, monitoring and management. This may be because once the wrong assessment is made, then the monitoring and management will also be incorrect.

Thirty percent of mothers used traditional medicine, and some of them had accessed primary healthcare services before using traditional medicines.

Forty-eight percent (9% of all deaths) of administrative factors were due to a lack of ICU beds.

Conclusion

The Child PIP programme needs dedication with the collection of data. It would be useful if there were a minimum data set collected for all wards nationally that included the information collected on the monthly tally sheets.

Children are dying of diseases that are preventable and treatable with tools that are simple, i.e. IMCI; prevention of HIV infection of young women; prevention of transmission of HIV from mother-to-child; and cotrimoxazole prophylaxis. Further, poverty remains a big obstacle and many children are malnourished.

Kalafong Hospital needs to intensify the PMTCT programme, by increasing HIV testing uptake during pregnancy; providing nevirapine and cotrimoxazole prophylaxis; and improving the ART programme by providing ART for mothers and infants.

Finally, children were referred late because IMCI guidelines were not followed and this programme needs to be intensified.

Mpumalanga

Barberton Hospital

Introduction

The 183-bedded Barberton Hospital is situated in the Umjini municipality, Ehlanzeni Health District of Mpumalanga. The estimated population of 50 000, from rural and peri-urban areas, are served through 8 clinics, 5 mobile clinics and the level 1 (district) hospital. The location near the borders of Swaziland and Mozambique leads to a large number of migrant labourers and their families making use of the healthcare facilities.

The paediatric ward has 35 beds and accommodates all medical and surgical admissions of children 10 years and younger. A separate ward manages newborns. Staff consists of one chief medical officer (who also covers for the obstetrics department and neonates), one community service officer and one intern. No consulting paediatrician is available and referrals are sent to Witbank Hospital (250km away).

Methods

Data collection began in May 2005 and continued to 31 December 2005, but information was retrospectively collected from registers and files dating from 1 January 2005. Admissions included all children 10 years and younger who were admitted to the ward for medical or surgical reasons.

Audit meetings were held quarterly due to the late implementation of the programme, but occurred monthly during 2006. All 17 doctors employed at the hospital attended these meetings, since doctors are on call for the whole hospital and everyone manages sick children. Involvement of nursing personnel and especially nursing staff from the clinics has proven difficult. Reasons for this include a shortage of personnel to cover work while others attend meetings; and transport problems from the clinics.

Results

Baseline data

A total of 1 305 patients was admitted from January to December 2005. There were 59 deaths giving a case fatality rate of 4.5%.

Barberton Hospital	*2005*
Total admissions	1305
Total deaths	59
Case fatality rate (%)	4.5
Total modifiable factors	120
Modifiable factor rate (per death)	2.0

Information about children who died

Demographics

Age	*2005 (% of all deaths)*
0-1 month	6.7
1 month-1 year	64.4
1-5 years	20.3
5-10 years	8.6
Total	100

Social context

Primary caregiver	*2005 (% of all deaths)*
Mother	69.0
Grandmother	8.0
Unknown	23.0
Total	100
Mother's wellbeing	***2005 (% of all deaths)***
Alive and well	39.0
Dead	7.0
Sick	24.0
Unknown	30.0
Total	100

Health context

NUTRITION

Weight	*2005 (% of all deaths)*
Normal	44.0
UWFA	17.0
Severe malnutrition	39.0
Total	100

HIV/AIDS

At Barberton Hospital, 54% of children who died were either HIV-infected or HIV-exposed.

Laboratory category	*2005 (% of all deaths)*
Negative	1.8
Exposed	35.6
Infected	18.6
Unknown	44.0
Total	100
Clinical HIV staging	***2005 (% of all deaths)***
Stage I	13.5
Stage II	8.5
Stage III	18.4
Stage IV	35.6
Not staged / Unknown	24.0
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*2005 (% of all deaths)*
NVP given	1.8
NVP not given	24.0
Unknown	75.0
Total	100

Inpatient mortality

The case fatality rates for various parameters are tabulated below.

	Admissions (no.)	*Deaths (no.)*	*Case fatality rate (%)*
All admissions	1305	59	4.5
0-1 month	66	4	6.0
1-12 months	425	38	8.9
1-5 years	553	12	2.2
5-13 years	260	5	1.9
Under-5 admissions	1045	54	5.2
Nutritional status:			
Severe malnutrition	79	23	29.0
Illness:			
ARI	259	29	11.0
DD	208	13	6.2

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
PCP(suspected)	22.0
Pneumonia, ARI	20.0
Chronic diarrhoea	12.0
Acute diarrhoea	8.0
TB: Pulmonary	8.0
Meningitis: Bacterial	5.0
Metabolic disorders	5.0
DKA	1.6
Liver failure	3.0
Septicaemia	3.0
Oncology: Tumour	1.6
Poisoning: Paraffin	1.6
Poisoning: Other	9.0

The five most common diagnoses (All diagnoses) were: suspected PCP, pneumonia, acute or chronic diarrhoea and complications from herbal medication ingestion.

Information about quality of child healthcare

Records	*2005 (% all deaths)*
Folder not available	12
Folder available: incomplete and/or inadequate	45
Folder available: OK	42
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*2005 (% of MFs)*
Home	59
Primary health clinic	6
Admission & Emergency care	16
Ward	19
Total	100
Modifiable factors: who?	***2005 (% of MFs)***
Caregiver and family	59
Administrator	26
Clinical personnel	15
Total	100

The 10 most common modifiable factors were:

- Family/Caregiver: Delay in seeking care; home treatment given with negative effect; inappropriate nutrition; RTHC not present; and insufficient information.
- Administrative: Lack of ICU facilities; lack of transport from the clinic to hospital and to referral hospital.
- Personnel: Insufficient case management; insufficient monitoring of blood glucose; and delay in referral of failure to thrive.

Discussion

About children who died

HEALTH CONTEXT

Malnutrition remains a problem with a high number of patients presenting at hospital for the first time with marasmus. This raises concerns about the identification and early intervention of malnutrition at clinic level.

The large majority of patients come from rural communities where there is still a stigma attached to HIV/AIDS, leading to unwillingness of mothers to be tested or to participate in the PMTCT programme. HIV/AIDS is the major contributing factor to deaths in all children. The hospital only started with a rollout of ART in October 2005 and children have limited access to it. PMTCT remains a major challenge with few pregnant women opting to test, and later not revealing the results of tests or interventions taken.

INPATIENT MORTALITY

The overall case fatality rate was 4.5%. This increased to 5.2% for the under-5 group and 29% for the severely malnourished. The CFR for

the severely malnourished may not actually have been this high, as the nutritional status was not always recorded in the admissions register and the number of admissions with severe malnutrition may thus have been underestimated.

About quality of child healthcare

From the modifiable factors it can be seen that delay in seeking help and home treatment given as the first option before attending the clinics or hospital are a major concern. This may also lead to a high number of deaths in the community that are never recorded.

Strong traditional beliefs often lead to traditional remedies being given at home with negative effect on the children (acidosis, dehydration, renal and liver failure), as well as late presentation at a healthcare facility with progressive underlying disease.

Mothers also show poor knowledge of dietary requirements for children, especially with weaning food. The unhealthy practice of early weaning and feeding infants with soft porridge is still a standard practice.

Records are insufficient in that the RTHC data is often not recorded and information regarding social circumstances (caregiver, health of mother and father, etc.) is poor.

Referral to tertiary care centres is often difficult to arrange due to unavailability of beds, waiting time for ambulances and the long distances over which critically ill patients must be transported.

Solutions

The following solutions and recommendations were identified:

- Education of mothers on HIV/AIDS and nutrition should be given priority at clinics and in hospitals. The community service dieticians are already involved in this education programme.
- The high number of HIV-related deaths is a clear indication that ART should be offered increasingly to children. In January 2006, the first two children started attending the ART clinic at the Barberton Hospital with their caregivers.

- The PMTCT programme has received attention since problems emerged early in the Child PIP auditing. This has led to increased participation of mothers in the PMTCT programme at antenatal level. The number of pregnant woman tested for HIV has increased from 7% to 49% in the past 6 months.
- Clear protocols on the management of common conditions were also revised and in-service training given to new doctors.
- An outreach programme from the referral hospital to help junior doctors would be of great benefit, even though there was only one modifiable factor describing the problem of a senior doctor not called.
- Record keeping should include social circumstances, RTHC data etc. Relevant training must be given to the doctors.

Conclusion

Participation in Child PIP auditing has been a valuable process for assessing the status of healthcare and the needs of the children in the Umjindi area. Problem areas include HIV and AIDS; malnutrition; and late presentation at healthcare facilities. These can be addressed by involving community health workers, nursing staff and doctors in audit meetings with feedback on findings. Successes, as seen in the PMTCT programme with increased numbers of mothers testing for HIV, will be an inspiration to show that intervention is successful.

Witbank Hospital

Introduction

Witbank Hospital is situated in the Nkangala district in Mpumalanga. It is the main referral hospital for all 25 provincial hospitals in Mpumalanga. The population of Witbank is 300 000, and there are 3 million people in the province. There are 10 primary health clinics and 2 community health centres in the municipal district.

The paediatric department currently consists of two full-time paediatricians, two rotating registrars from the University of Pretoria, five medical officers, one community service doctor and four interns.

The wards only admit medical cases (surgical cases have their own ward).

Methods

Data collection reported was for 2004 and 2005. Surgical admissions and deaths were not included. The ward clerk collected basic data while the doctor in charge of the specific wards collected death data.

Mortality meetings were conducted weekly. All doctors, as well as a nursing representative for each ward, were expected to attend and participate. The meetings lasted one hour on average and they were regarded as hugely beneficial.

Results

Baseline data

Witbank Hospital	*2004*	*2005*
Total admissions	2261	2308
Total deaths	138	128
Case fatality rate (%)	6.1	5.5
Total modifiable factors	70	190
Modifiable factor rate (per death)	0.50	1.48

Information about children who died

Demographics

Age	*2004 (% of all deaths)*	*2005 (% of all deaths)*
1 month-1 year	64	54
1-5 years	21	36
5-13 years	15	10
Total	100	

Social context

Mother's wellbeing	*2004 (% of all deaths)*	*2005 (% of all deaths)*
Alive and well	45.0	66.7
Dead	8.0	15.9
Sick	7.0	9.5
Unknown	35.5	7.9
Total	100	100

Health context

NUTRITION

Weight	*2004 (% of all deaths)*	*2005 (% of all deaths)*
Overweight	8.0	4.8
Normal	40.0	25.4
UWFA	24.0	30.2
Severe malnutrition	28.0	39.7
Total	100	100

HIV/AIDS

Below are tables pertaining to HIV at Witbank Hospital.

Laboratory category	*2004 (% of all deaths)*	*2005 (% of all deaths)*
Negative	19.0	11.1
Exposed	51.0	49.2
Infected	21.0	30.2
Unknown	9.0	9.5
Total		100
Clinical HIV staging	*2004 (% of all deaths)*	*2005 (% of all deaths)*
Stage I	[1]	0.0
Stage II	[1]	1.6
Stage III	[1]	15.9
Stage IV	[1]	57.1
Not staged	[1]	25.4
Total		100

[1] No data

PMTCT

Nevirapine (NVP) prophylaxis	*2005 (% of all deaths)*
NVP given	3.2
NVP not given	71.4
Mother negative	11.1
Unknown	14.3
Total	100

Inpatient mortality

The case fatality rates for various parameters are tabulated below.

	Admissions (no.)		*Deaths (no.)*		*Case fatality rate (%)*	
	2004	*2005*	*2004*	*2005*	*2004*	*2005*
All admissions	2261	2308	138	128	6.1	5.5
1-12 months	1090	1141	93	89	8.5	7.8
1-5 years	858	847	32	29	3.7	3.4
5-13 years	313	320	13	10	4.2	3.1
Under-5 admissions						
Nutritional status:						
< 3rd centile	[1]	628	[1]	86	[1]	13.7
Illness:						
ARI	693	846	57	63	8.2	7.4
DD	411	461	7	14	1.7	3.0

[1] No data

Causes of child deaths

Main diagnosis	*2004 (% of all deaths)*	*2005 (% of all deaths)*
ARI (including PCP)	45.6	44.0
AIDS (ill-defined final cause)	9.6	15.9
Septicaemia	8.0	12.7
Acute diarrhoea	4.8	4.8
Congenital heart disease	3.2	4.7

Information about quality of child healthcare

Records	*2004 (% all deaths)*	*2005 (% all deaths)*
Folder not available	0	0
Folder available: incomplete and/or inadequate	8	27
Folder available: OK	92	73
Total	100	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Where MFs they occur	*2004 (% of MFs)*	*2005 (% of MFs)*
Home	58	45
Primary health clinic	28	17
Admission & Emergency care	3	15
Ward	11	20
Total	100	100
Who is responsible for MFs	***2004 (% of MFs)***	***2005 (% of MFs)***
Caregiver and family	58	45
Administrator	26	17
Clinical personnel	16	38
Total	100	100

Discussion

About children who died

Infants (1month-1year) still account for the majority of child deaths in the institution but there was a significant reduction (64% to 54%) since 2004. Conversely, a higher percentage of deaths now occur in the 1 year-5 year age group (36% to 21%).

HEALTH CONTEXT

A marked increase in deaths with associated malnutrition was observed.

Witbank Hospital's child deaths remain mostly HIV-related. Only 11% of all deaths in 2005 were in HIV-negative children, while a further 9.5% were not tested (mainly due to consent refusal). Most of the last group presented with clear signs of HIV-infection. Furthermore, suspected PCP remains by far the number one cause of child mortality in our institution.

INPATIENT MORTALITY

The Witbank Hospital staff recorded 128 deaths in 2005 with an overall case fatality rate of 5.5, which was a slight improvement from 2004.

About quality of child healthcare

More modifiable factors were recorded in the ward and relating to clinical personnel in 2005 but it is believed that this was due to improvement in the death audits, rather than to worsening service.

Family/caregiver related modifiable factors were still impacting on mortality rates. Home treatment and delay in seeking care were the most common modifiable factors.

Case assessment at clinic level was identified as a problem. This was mainly due to upward promotion and resignations of experienced IMCI-trained sisters, whose replacements were not yet IMCI-trained.

Modifiable factors in the wards, especially relating to case management and monitoring after hours, were more readily identified due to better scrutiny of patient files. The poor case management and monitoring after hours was due to insufficient training and lack of experienced insight of junior doctors, as well as the continuous rotation of the junior doctors.

The main reason for the high number of HIV-related deaths and especially those due to PCP was the failure of the PMTCT programme. Due to inadequate counselling the percentage of pregnant mothers consenting to HIV testing was only 15% in the Witbank district during 2004 and the first half of 2005.

Solutions

The following solutions and recommendations were identified:

- Strengthen the PMTCT programme:
  - The provincial office was aware of the poor uptake rate for testing in pregnant mothers. Staff provided impetus to the understanding of the problem by using the Child PIP data to show the correlation between the high number of PCP deaths and the failure of PMTCT. Actions undertaken by the provincial office to improve the situation included: increasing training of clinic sisters in PMTCT; changing counselling practice during first ante-natal visit from

group to individual counselling; and other measures. The percentage of pregnant mothers consenting to testing for HIV increased to between 65 and 85% in the district. This should lead to a reduction in PCP deaths in 2006, and progress will be tracked with Child PIP. Witbank Hospital staff will also continue to raise awareness of the importance of PMTCT with the help of Child PIP data.

- Start ART rollout:
  - A paediatric wellness clinic was started at Witbank Hospital in 2005 and staff will monitor the impact on the HIV-related deaths.
- Strengthen IMCI training at clinic level:
  - Witbank Hospital is involved in IMCI training on a continuous basis. Staff has completed an IMCI training course where the hospital's facilities were used, doctors used as facilitators and 80 local nurses were trained.
  - Staff will continue to liaise with the district MCWH co-ordinator in this regard.
- Improve case management and monitoring skills in junior doctors:
  - The hospital started a programme of formal lectures lasting for two weeks for all interns and community service doctors. This course is repeated with every new rotation.
  - Protocols were completed and are available on computers in the wards.
  - Continuous evaluation and guidance are available.

Conclusion

Child PIP plays a big role in the effort to improve Witbank Hospital's services. The facility will continue to use Child PIP to implement changes and monitor the effects on the mortality rate. The amalgamated data from all the ChIP sites should be used constructively at a national level.

Limpopo

Bela-Bela Hospital

Introduction

Bela-Bela Hospital is situated in the Waterberg region of Limpopo province and serves a population of 63 000. It is a rural regional hospital with 106 beds, 24 of which are dedicated to paediatric patients. Four hospitals and four clinics refer patients to the institution. The paediatric ward has only had three professional nurses and one full time paediatrician since 1996. A community service doctor or an intern rotates on a monthly basis. The ward is mixed, with medical and surgical patients.

Methods

Bela-Bela Hospital reported on all paediatric admissions and deaths, both medical and surgical, from 1 January to 31 December 2005. The collection of data about the nutritional status of inpatients is still a problem because it is not well recorded in the admission register book. Data were processed manually.

Audit meetings were not held regularly because clinical personnel are under pressure most of the time. Those meetings that were held were poorly attended, and only lasted approximately one hour.

Results

Baseline data

A total of 753 patients was admitted from January to December 2005. There were 40 deaths giving a case fatality rate of 5.3%.

Bela-Bela Hospital	*2005*
Total admissions	753
Total deaths	40
Case fatality rate (%)	5.3
Total modifiable factors	139
Modifiable factor rate (per death)	3.48

Information about children who died

Demographics

Age	*2005 (% of all deaths)*
0-1 month	0
1 month-1 year	58.5
1-5 years	41.5
Total	100

Social context

Primary caregiver	*2005 (% of all deaths)*
Mother	75.0
Grandmother	15.0
Other	2.5
Unknown	7.5
Total	100

Mother's wellbeing	*2005 (% of all deaths)*
Alive and well	20.0
Dead	5.0
Sick	32.0
Unknown	44.0
Total	100

Health context

NUTRITION

Weight	*2005 (% of all deaths)*
Normal	12.2
UWFA	46.3
Severe malnutrition	41.5
Total	100

HIV /AIDS

At Bela-Bela Hospital, 66% of children who died were either HIV-infected or HIV-exposed.

Laboratory category	*2005 (% of all deaths)*
Negative	2.5
Exposed	45.0
Infected	22.5
Unknown	29.3
Total	100

Clinical HIV staging	*2005 (% of all deaths)*
Stage I	16.0
Stage II	10.0
Stage III	37.5
Stage IV	27.5
Not staged / Unknown	9.8
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*2005 (% of all deaths)*
NVP given	12.5
NVP not given	7.5
Mother negative	0
Unknown	80.0
Total	100

Inpatient mortality

The case fatality rates for various parameters are tabulated below.

	Admissions (no.)	*Deaths (no.)*	*Case fatality rate (%)*
All admissions	884	41	4.6
0-1 month	5	0	0
1-12 months	234	24	10.2
1-5 years	519	16	3.0
5-13 years	217	1	0.5
13-18 years	4	0	0
Under-5 admissions			
Nutritional status:			
< 3rd centile	104	34	32.7
Illness:			
ARI	245	18	7.3
DD	135	11	8.1

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
Pneumonia	45.0
Diarrhoeal disease	20.0
Septicaemia	10.0
PTB	7.5
PCP	5.0

The five most common diagnoses (All diagnoses) were: Pneumonia, symptomatic HIV/PEM, perinatal exposure to HIV, diarrhoeal disease and traditional herbal medicine poisoning.

Information about quality of child healthcare

Records	*2005 (% all deaths)*
Folder not available	0
Folder available: incomplete and/or inadequate	58.5
Folder available: OK	41.5
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*2005 (% of MFs)*
Home	33.8
Primary health clinic	8.6
Admission & Emergency care	35.2
Ward	22.3
Total	100
Modifiable factors: who?	***2005 (% of MFs)***
Caregiver and family	33.8
Administrator	14.4
Clinical personnel	51.8
Total	100

Discussion

About children who died

Bela-Bela Hospital serves a community characterised by poverty associated with high unemployment rates, lack of education and skills, and traditional beliefs resulting in negative effects and the spread of the HIV pandemic. On average, 62 patients under-five years were admitted monthly. Babies under one month were not included.

SOCIAL CONTEXT

One third of the mothers were sick and the health status of more than one third was unknown.

HEALTH CONTEXT

Almost 90% of the under-5 deaths were malnourished. Almost 50% of the malnourished dead children were classified as having severe protein energy malnutrition. The most common clinical presentation was marasmus.

Sixty-six percent of the dead patients were HIV-infected or HIV-exposed. Caregivers declined HIV testing in 22.5% of deaths. Only one dead patient tested negative for HIV. There is still a high tendency in the community to decline HIV testing due to lack of information and ignorance about HIV. The lack of information about PMTCT may reflect poor implementation and performance of the programme. Only 12% of the dead patients received nevirapine.

Deaths classified as HIV Stage III were the most common, followed by stage IV. This could have been influenced by the change in staging systems from three to four stages during 2005.

INPATIENT MORTALITY

Mortality rates were high, similar to other rural hospitals in the country that face similar problems.

CAUSES OF DEATH

The profile of causes of death was similar to other rural hospitals in the country. Most deaths associated with HIV can be considered avoidable.

About quality of child healthcare

Modifiable factors occurred more frequently in the administration and emergency settings, followed by the home setting. Factors such as inappropriate nutrition, home treatment with negative effect, delay in seeking care and declining HIV testing appeared. Lack of RTHCs at clinics made the accurate assessment of clinic modifiable factors difficult.

Clinical personnel were the most involved in modifiable factors, followed by care givers. The most prevalent modifiable factor at Bela-Bela Hospital was incomplete history taking and that is a very important cornerstone for making an adequate diagnosis and giving effective management. Insufficient assessment of shock/dehydration and not checking and reassessing the child were also present. There is room for improvement in the adequacy of patients' files.

Possible reasons for the problems that have been identified by Child PIP are the incomplete implementation of programmes such as IMCI, PMTCT, ART; the lack of clinical personnel; inadequate organization; lack of support; and lack of systematic audits.

Solutions

Solutions and recommendations include:

- Expand, implement and continue training in IMCI and the management of paediatric HIV.
- PMTCT programme to be fully implemented and supervised.
- The need for a national paediatric recording sheet for admissions that is easy, simple and effective.
- Antiretroviral treatment to be fully implemented and supervised. Report all adverse reactions to medicines, including traditional medicines.
- Sufficient, trained nursing staff and doctors to be available at all times. Implement a policy on paediatric ward personnel management.
- Review and implement standards for paediatric care at departmental/domain level.
- Full support from management to paediatric departments is vital.

Conclusion

The Child PIP audit process is an effective tool when implemented in health institutions that have support from the hospital management.

Beginning Child PIP is an achievement of note, as is giving feedback from the ChIP audit process to the relevant role-players (health workers and management). The Child PIP project will continue to obtain information on children who die in Bela-Bela Hospital by gathering mortality data, analysing deaths in mortality meetings, categorizing HIV status and assessing programme parameters such as PMTCT, PCP prophylaxis, feedings practices and ART usage by children and their parents.

Child PIP provides hope for children and health personnel, both clinical and administrative, in order to find solutions to the high child mortality rates.

North West

Central District and Mafikeng Provincial Hospital

Introduction

The Central District (Mafikeng region) consists of five sub-districts: Ramotshere-Moiloa, Ditsobotla, Mafikeng, Ratlou and Tswaing. There are four district hospitals: Zeerust, Lehurutshe, Thusong-General DelaRey and Gelukspan. Mafikeng Provincial Hospital (MPH) serves as a district hospital for Mafikeng sub-district and as level two referral hospital for the smaller hospitals. All five hospitals participate in the Child PIP mortality audit. The main findings are summarised in this report.

Central District has 119 PHC facilities. They serve a mainly rural and peri-urban population, estimated at 822 407, with 81 316 children under 5 years of age.

The four district hospitals have mixed paediatric wards, for medical and surgical patients. The paediatric work is done by medical officers or community services doctors who also have other duties in their districts and hospitals. Mafikeng Provincial Hospital has separate medical and surgical wards and a paediatric OPD. A paediatric ART clinic was started in December 2005. Four medical officers and a sessional paediatrician (4 hours per week) do the paediatric and neonatal work. The author works as district paediatrician for Central District.

Methods

The data collection period was 1 January to 31 December 2005. Information on all paediatric admissions and deaths was collected from ward registers, patient files, RTHCs, interviews with caregivers and during audit meetings. Infants below 1 month of age were excluded, as their deaths were analysed in a separate perinatal audit. In MPH admissions and deaths in the surgical ward were not included.

Audit meetings were held in MPH every fortnight and once a month in the district hospitals. Two to fourteen cases were discussed per meeting and the duration of the meetings varied between one and two and a half hours. Between two and eight doctors, and one to ten nurses attended each meeting. Clinic nurses or district health managers

were present at 75% of the meetings. Ninety-two percent of deaths were analysed in audit meetings and the remaining cases were analysed by file review, done by two doctors.

Results

Baseline data

In Central District hospitals, 180 out of 3 180 admitted paediatric patients died, giving a case fatality rate (CFR) of 5.6%. In MPH the total number of medical paediatric admissions was 2 123 with a CFR of 9.5%. The following tables give detailed findings for the under-5 age group at all the hospitals in Central District.

Under-5 admissions	*Thusong-GDLR*	*Zeerust*	*Lehurutshe*	*Gelukspan*	*Central district 2004*	*Central district 2005*
Total under-5 admissions	976	433	699	415	2649	2523
Total under-5 deaths	64	33	41	35	210	173
Case fatality rate (%)	6.6	7.6	5.9	8.4	7.9	6.9
Total MFs	232	133	142	183	1)	707
MF rate (per death)	3.6	4.0	3.3	4.7	1)	4.1

Under-5 admissions	*MPH 2004*	*MPH 2005*	*Central district and MPH, 2004*	*Central district and MPH, 2005*
Total under-5 admissions	1740	1676	4389	4199
Total under-5 deaths	146	176	356	439
Case fatality rate (%)	8.4	10.5	8.1	8.3
Total MFs	1)	818	1)	1525
MF rate (per death)	1)	4.0	1)	4.0

1) No data

Information about children who died

Demographics

The following tables show the percentage of deaths in infants (1 month-1 year) in the different hospitals and compare 2004 and 2005 where data is available.

Age	*Thusong-GDLR*	*Zeerust*	*Lehurutshe*	*Gelukspan*	*Central district 2004*	*Central district 2005*
1 month-1 yr	77	64	73	74	68	72
Other	23	36	27	26	32	28
Total	100	100	100	100	100	100

Age	*MPH 2004*	*MPH 2005*	*Central district and MPH, 2004*	*Central district and MPH, 2005*
1 month-1 yr	65	71	67	71
Other	35	29	33	29
Total	100	100	100	100

Social context

Mother's wellbeing	*2005 (% of all deaths)*
Alive and well	56
Dead	9
Sick	20
Unknown	15
Total	100

Health context

NUTRITION

The prevalence of severe malnutrition in child deaths has increased from 30% in 2004 to 44% in 2005. In 2005, 27% of children with severe malnutrition were HIV-infected, 24% HIV-exposed, one child was HIV-negative and the remaining were not tested or had no results.

Weight	*Thusong-GDLR*	*Zeerust*	*Lehurutshe*	*Gelukspan*	*MPH*	*Central District*
Normal	20	18	21	3	29	23
UWFA	29	30	35	36	30	31
Severe maln.	48	45	36	62	40	44
Unknown	3	6	9	0	2	3
Total	100	100	100	100	100	100

HIV/AIDS

The following table represents combined data from all hospitals in Central District, including MPH. Children below 15 months with a positive HIV antibody test (no PCR) are classified as exposed. Only three HIV-positive children had been on ART.

Stage / *Lab*	Stage I	Stage II	Stage III	Stage IV	Not staged/ Unknown	*Total (no.)*
Negative	5	1	1	1	8	16
Exposed	1	7	27	54	4	93
Infected	0	1	24	37	0	62
Unknown/No result	1	15	37	79	80	212
Total	7	24	89	171	92	383

PMTCT

The following table shows PMTCT coverage as percentages of all paediatric deaths in Central District hospitals.

NVP prophylaxis	*Thusong-GDLR*	*Zeerust*	*Lehurutshe*	*Gelukspan*	*MPH*	*Central District*
NVP given	12	12	7	10	5	7
NVP not given	20	21	14	23	24	22
Mother -ve	5	3	12	8	3	4
No data	63	64	67	59	69	67
Total	100	100	100	100	100	100
Infant feeding						
Excl. breast	19	21	21	28	10	16
No breast, ever	17	15	12	8	7	10
Mixed	26	12	12	18	23	21
No data	39	52	56	46	60	54
Total	100	100	100	100	100	100
Cotrimoxazole prophylaxis						
Current	6	3	12	10	7	7
Ever	5	0	0	3	3	3
Never (but ind.)	22	15	9	15	10	13
Never (not ind.)	3	0	5	5	2	3
No data	65	82	74	67	78	74
Total	100	100	100	100	100	100

Inpatient mortality

The under-5 case fatality rates for various parameters in the different hospitals are tabulated below.

Under-5 admissions	*Thusong-GDLR*	*Zeerust*	*Lehurutshe*	*Gelukspan*	*Central district 2004*	*Central district 2005*
Age:						
1 month-5 years						
Admissions (no.)	976	433	699	415	2649	2523
Deaths (no.)	64	33	41	35	210	173
CFR (%)	6.6	7.6	5.9	8.4	7.9	6.9
Illness:						
ARI						
Admissions (no.)	284	109	218	78	806	689
Deaths (no.)	27	10	20	9	54	66
CFR (%)	10.0	10.0	9.2	11.5	6.9	9.6
DD						
Admissions (no.)	242	111	116	60	610	529
Deaths (no.)	8	4	3	4	30	19
CFR (%)	3.0	4.0	3.0	6.7	4.8	3.6

Under-5 admissions	*MPH 2004*	*MPH 2005*	*Central district and MPH, 2004*	*Central district and MPH, 2005*
Age:				
1 month-5 years				
Admissions (no.)	1740	1676	4389	4199
Deaths (no.)	146	176	356	349
CFR (%)	8.4	10.5	8.1	8.3
Illness:				
ARI				
Admissions (no.)	508	1)	1314	1)
Deaths (no.)	43	66	97	132
CFR (%)	9.0	1)	7.4	1)
DD				
Admissions (no.)	240	1)	850	1)
Deaths (no.)	11	17	41	47
CFR (%)	5.0	1)	4.8	1)

1) No data

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
Pneumonia, ARI	16.71
Septicaemia, possible serious bacterial infection	16.45
PCP (suspected)	15.67
Acute diarrhoea, hypovolaemic shock	8.88
TB: Pulmonary	8.62
Other diagnosis (terminal AIDS)	8.36
Meningitis: bacterial	6.53
Ill-defined/ unknown causes/ no info	5.74
Heart failure, Pulmonary Oedema	2.09
TB: Meningitis	2.09
Inhalation of foreign body or gastric content	1.57
Surgical (e.g. Appendix, intestines, peritoneum)	1.04
Croup	0.78
Cirrhosis, liver failure, hepatitis	0.78
Burns	0.52
Cardiomyopathy	0.52
Chronic diarrhoea	0.52
Other (specify)	0.52
TB: Miliary, other extra pulmonary	0.52
Status epilepticus	0.52
Pneumothorax, Pyothorax, Pleural effusion	0.26
Other respiratory failure	0.26
Other serious infection	0.26
Leukaemia's/ malignancies	0.26
Hospital-acquired infection	0.26
Cong malformations of the respiratory system	0.26
Congenital Heart Disease	0.26
Congenital Infections (not HIV)	0.26
Total	100

Additional to the main cause of death the Child PIP system allows the user to enter other important diagnoses associated with the death. When adding up all causes of deaths and important diagnoses the following were identified as most common:

All diagnoses: top 5	*Main*	*Other*	*Total*	*Percent*
Septicaemia, possible serious bacterial infection	63	44	107	16.4
Pneumonia, ARI	64	38	102	15.6
Acute diarrhoea, hypovolaemic shock	34	36	70	10.7
PCP (suspected)	60	4	64	9.8
TB: Pulmonary	33	28	61	9.3

There were ten cases of TBM and nine cases of miliary/extra-pulmonary TB. Ten children had hospital-acquired infections.

Information about quality of child healthcare

The following tables summarise the quality of patient records as a percentage of all child deaths.

Records	*Thusong -GDLR*	*Zeerust*	*Lehuruts*	*Geluksp*	*MPH*	*Central District*
Folder not available	3	0	5	0	1	2
Folder incomplete	66	42	34	28	67	57
Folder available: OK	31	58	61	72	32	41
Total	100	100	100	100	100	100

The following tables show the occurrence of modifiable factors as a percentage of the total modifiable factors in each category, in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*Thusong -GDLR*	*Zeerust*	*Lehuruts*	*Geluksp*	*MPH*	*Central District*
Home	5	7	10	7	10	6
Primary health clinic	16	22	22	40	11	23
A & E care	46	42	35	39	34	38
Ward	25	25	28	13	38	29
Other	8	4	5	1	7	4
Total	100	100	100	100	100	100
Modifiable factors: who?						
Caregiver and family	7	8	10	7	12	7
Administrator	11	15	27	33	37	23
Clinical personnel	82	77	63	60	51	70
Total	100	100	100	100	100	100

Caregiver-related modifiable factors:

The most common modifiable factors were: Delay in seeking care; declining HIV test; and infrequent clinic attendance.

Administrative modifiable factors:

The most common factor for Gelukspan was the lack of doctors.

MPH identified several modifiable factors including: Lack of professional nurses during night/weekend; lack of doctors for the ART clinic; lack of paediatric ICU facilities; and overcrowding in the ward.

Lehurutshe also indicated that the facility lacked professional nurses.

Zeerust identified a lack of senior doctors.

All hospitals had some equipment shortages, especially pulse oxymeters and oxygen head boxes.

Clinical personnel - PHC level:

Clinical personnel include nurses and doctors. The most common factors identified were IMCI not used for case assessment and case management; no TB contact treatment and delay in referring for failure to thrive.

Clinical personnel - Admission and Emergency care:

The most common problems were: Lack of monitoring: oxygen, shock and glucose; incomplete history taking and physical examination; and insufficient case management: shock and antibiotic prescribing.

Clinical personnel - Ward:

Common problems were lack of glucose monitoring; insufficient intake-output charting; insufficient assessment during previous OPD visit/admission; insufficient investigations (especially lumbar punctures); and insufficient prescribing: IV fluids, NG tube feedings, antibiotics and TB treatment.

Discussion

About children who died

HEALTH CONTEXT

Forty-four percent of all children who died had severe malnutrition (compared to 30% in 2004). Of these, 51% were HIV-exposed or HIV-infected, 1% were HIV-negative and the remainder were not tested. This shows the tremendous triple burden of HIV: infections (including chronic infections like TB), malnutrition and poverty. The children admitted in 2005 were sicker than in 2004. This also explains the increased case fatality rates.

PMTCT and detailed HIV data were not available in previous versions of Child PIP. The data from the hospitals in Central District demonstrate the crisis in the PMTCT programme, which must be addressed, as well as a tremendous lack of information. Paediatric ART services are being expanded in Central District, and subsequently data collection by health workers about PMTCT should become more rigorous.

Sixty-eight percent of the children who died were clinically HIV stage III or IV. Forty percent of the children who died tested HIV-positive and only 4% tested HIV-negative. The remainder were not tested. The availability of PCR testing in Central District should greatly improve the accuracy of HIV testing in children less than 15 months of age.

INPATIENT MORTALITY

Paediatric admissions decreased markedly in Gelukspan during the first six-month period of 2005 due to the extreme shortage of doctors. The hospital admitted only few, but very sick children. Thus, the case fatality rate (CFR) increased tremendously. This improved during the second half of 2005. However, the shortage of doctors in all hospitals of Central District (including Mafikeng Provincial Hospital) still needs to be addressed with effective strategies. Zeerust CFRs have also increased from 2004 to 2005, reflecting the shortage of senior (post-community service) doctors. Thusong CFRs have improved and the hospital management (including the clinical manager) were always present during the audit meetings, and actively involved in follow-up of problems identified by Child PIP. The hospital also had a senior doctor supervising the paediatric ward.

The CFRs of MPH have increased markedly. As MPH is a referral hospital, children admitted there are often sicker, and higher CFRs are expected. The hospital urgently needs two fulltime paediatricians, more professional nurses (especially during the night and weekends), and more space for the paediatric wards. The CFRs for ARI and DD could not be calculated for MPH due to poor data collection in the ward registers. This should be improved.

CAUSES OF DEATH

Pneumonias including PCP were the main killers of children, followed by sepsis, DD and TB. Most of these causes are preventable and

treatable. An improvement in adult TB case detection and complete treatment will reduce paediatric TB.

About quality of child healthcare

Patient records are reviewed to evaluate the quality of paediatric care. If the quality of records is poor, the analysis is incomplete and problems in patient care cannot be identified.

The number of modifiable factors identified has increased from 3.4 per 100 deaths in 2004 to 4.1 per 100 deaths in 2005. The severe shortage of doctors (in all hospitals, but especially in Gelukspan), the shortage of nurses and space in some paediatric wards constitute 'chronic' modifiable factors in 2005 and have thus influenced this statistic.

The number of identified modifiable factors in the PHC setting should be viewed with caution, as 57% of cases did not have RTHCs for analysis. Thus potential problems could not be identified.

The clinical personnel-related modifiable factors in hospital admission and ward care give clear direction for further training and the need for implementation of effective protocols. Nurses and doctors in rural areas rotate and change frequently. There is a need for re-training, orientation and effective supervision, and more senior doctors and paediatricians to conduct the training. Special attention should be given to the care of sick infants as 71% of paediatric deaths occurred in the age group 1-12 months.

Solutions

- Evaluate PMTCT urgently to identify the obstacles to implementation. Strategies to improve coverage and effectiveness of the programme should be implemented urgently. Access to exclusive formula feeding for nine months should be available everywhere in Central District as the safety of exclusive breastfeeding is not proven. Effective communication between the antenatal staff, records and the child's RTHC should be instituted, so that the child's health worker knows about PMTCT for the mother, the feeding decision and cotrimoxazole prophylaxis.

- Strengthen ART clinics for paediatric patients in all hospitals. More doctors, nurses and other health workers must be employed for these services.

- Improve implementation of the management of severe malnutrition in all institutions.
- Strengthen the implementation and supervision of IMCI at PHC level. Training is always required as there is continuous movement of health workers out of the rural areas.
- Improve paediatric triage and care, especially in casualty and during admission. Doctors and nurses who only see children after-hours must be trained to do this. Paediatricians and senior doctors with paediatric experience are needed to do this training, to supervise and to advise.
- Improve data collection on paediatric admission.
- Implement strategies for the recruitment and retention of senior nurses and doctors (including paediatricians). Pay a rural allowance throughout Central District, including MPH. All doctors and senior nurses should have exit interviews conducted by senior managers and doctors, to identify the reasons why high numbers of health workers leave the public service and rural districts.

Conclusion

Child PIP is well established and accepted in Central District and it is used by many doctors, nurses and managers to regularly monitor and evaluate paediatric services and to give feedback to the stakeholders.

During 2005 the programme had a number of technical teething problems due to software development. These will soon be resolved and then Child PIP can be taken to other districts in North West, to improve child health services and paediatric care.

KwaZulu-Natal

Christ the King Hospital

Introduction

Christ the King Hospital is a 197 bed district hospital situated in Ixopo, a small town in the south western part of KwaZulu-Natal, 98km from Pietermaritzburg and 150km from Durban. The hospital serves the Ubuhlebezwe municipality which has a mainly rural population of approximately 119 678. The hospital serves eight primary health clinics and refers to Edendale Hospital and Grey's Hospital in Pietermaritzburg.

The paediatric ward is mixed, surgical and medical, and admits children up to 12 years of age. There are 40 paediatric beds in use in the ward, with a total capacity of 62 beds. A community service doctor is responsible for the ward and the senior doctors are usually available to discuss problem cases, as are the paediatric registrars at the referral hospitals. A flying doctor paediatrician visits once a month to do problem rounds and follow up on problem cases. Usually there is one chief professional nurse, two professional nurses, three staff nurses and three nursing assistants during the day, with one professional nurse, one staff nurse and two nursing assistants in the ward at night.

Methods

All deaths were collected from 1 January to 31 December 2005 including medical and surgical patients, and all dead-on-arrival children from the outpatient department. Files from all deaths were analysed and the Child PIP form completed and filed. The form was completed within 24 hours of the child's death. The information was entered on the computer and the data analysed using Child PIP.

Problems included difficulties with data collection from patients that died in the outpatients department as the doctor often forgot to complete the Child PIP form or to send the form to the ward for filing. Another problem was that not all the information required on the Child PIP form was obtained at admission and therefore many fields on the forms were marked as unknown.

Audit meetings were held on the third Wednesday of every month. This only started in December 2005 and was incorporated with the perinatal mortality meetings that were already being held. Staff from the paediatric ward and labour ward, as well as clinic sisters, doctors and management attends the meetings. The deaths were presented, modifiable factors highlighted and interesting cases discussed thoroughly. The variety of people present helped with sharing of knowledge and coming up with reasonable actions to be implemented.

Results

Baseline data

A total of 1 467 patients was admitted in from January to December 2005. There were 119 deaths giving a case fatality rate of 8.1%.

Christ the King Hospital	*2005*
Total admissions	1467
Total deaths	119
Case fatality rate (%)	8.1
Total modifiable factors	282
Modifiable factor rate (per death)	2.3

Information about children who died

Demographics

Age	*2005 (% of all deaths)*
0-1 month	13.7
1 month-1 year	48.1
1-5 years	33.6
5-13 years	4.6
Total	100

Social context

Primary caregiver	*2005 (% of all deaths)*
Mother	48.1
Grandmother	23.0
Other	2.2
Unknown	26.7
Total	100
Mother's wellbeing	***2005 (% of all deaths)***
Alive and well	60.0
Dead	3.7
Sick	3.0
Unknown	33.3
Total	100

Health context

NUTRITION

Weight	*2005 (% of all deaths)*
Overweight	2.2
Normal	23.7
UWFA	30.4
Severe malnutrition	23.7
Unknown	20.0
Total	100

HIV/AIDS

At Christ the King Hospital, 38% of children who died were either HIV-infected or HIV-exposed, but HIV test results were unknown in almost two-thirds of the cases.

Laboratory category	*2005 (% of all deaths)*
Negative	1.5
Exposed	33.3
Infected	4.4
Unknown	60.8
Total	100
Clinical HIV staging	*2005 (% of all deaths)*
Stage I	3.0
Stage II	4.4
Stage III	8.1
Stage IV	5.9
Not staged / Unknown	78.3
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*2005 (% of all deaths)*
NVP given	13.3
NVP not given	12.6
Mother negative	3.0
Unknown	71.1
Total	100

Inpatient mortality

The case fatality rates for various parameters are tabulated below.

	Admissions (no.)	*Deaths (no.)*	*Case fatality rate (%)*
All admissions	1467	119	8.1
0-1 month	122	5	4.1
1-12 months	570	68	11.9
1-5 years	443	40	9.0
5-13 years	332	6	1.8
Under-5 admissions			
Illness:			
ARI	378	45	11.9
DD	308	46	14.9

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
ARI	25.9
Acute diarrhoea	16.3
Chronic diarrhoea	14.1
PCP	8.8
Septicaemia	7.4
PTB	2.2
Non accidental injury/neglect	2.2
Other	23.4
Total	100

Information about quality of child healthcare

Records	*2005 (% all deaths)*
Folder not available	21.5
Folder available: incomplete and/or inadequate	66.6
Folder available: OK	11.9
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*2005 (% of MFs)*
Home	40.6
Primary health clinic	4.6
Admission & Emergency care	10.2
Ward	15.9
Other	28.6
Total	100
Modifiable factors: who?	*2005 (% of MFs)*
Caregiver and family	49.8
Administrator	16.6
Clinical personnel	33.6
Total	100

Discussion

About children who died

SOCIAL CONTEXT

The community is very rural and people may not have access to varied healthy food sources and speedy transport to healthcare facilities.

HEALTH CONTEXT

Most deaths were part of the HIV pandemic. PMTCT is not fully implemented. There is stigma associated with HIV that makes mothers change their feeding practices and not want to disclose their status to healthcare providers.

INPATIENT MORTALITY

The case fatality rate was comparable to that of the whole of South Africa yet too many children are dying.

CAUSES OF DEATH

Most children have infectious causes of death, i.e. ARI and DD. However, many elderly family members encourage the use of traditional home remedies, which may have been modified to such an extent that they have become toxic to the patient.

About quality of child healthcare

Most modifiable factors were found at home. Caregiver factors were mainly nutritional, not recognising the severity of an illness and delay in seeking care.

Education at primary healthcare level was poor.

Inpatient problems were associated with assessment, monitoring, fluids and delay in referring.

Solutions

- Educate the community on early recognition of illness, speedy seeking of care and the dangers of home remedies.
- Educate communities on effective and healthy feeding practices.
- Train primary healthcare staff on PMTCT.
- Establish more clinics with properly trained primary healthcare staff.
- Provide adequate staffing and equipment in hospital to meet the needs of the community.
- Inform hospital management about identified factors and make positive changes.

Conclusion

Child PIP has helped Christ the King Hospital look closely at current programmes and has encouraged implementation of changes that will positively influence the outcome for very sick children. The HIV pandemic is a major contributory factor that negatively influences the outcome of many sick children. The focus needs to be more on outreach programmes to the community. Doing the Child PIP audit has enabled the administrators and management to see where the main problems are and effect positive change.

Edendale Hospital

Introduction

Edendale Hospital is a mixed regional and district 900 bed hospital situated in the Edendale/Imbali suburbs of Pietermaritzburg. The hospital is an important component of the developing metropolitan complex of hospitals that includes Grey's Hospital (tertiary and regional, with 500 beds) and Northdale Hospital (district hospital, with 385 beds).

Edendale Hospital serves the local urban and rural communities (population of approximately 1.4 million) through an established system of clinics. Paediatric medical staffing was variable but on average during the year, there were four to six interns, one community service doctor, four medical officers/registrars and two to three full-time consultants and two part-time consultants.

Methods

Data collection was done for the five months April, May, June, October and November 2005. Only paediatric medical cases were included and a paediatric consultant retrieved information retrospectively.

The monthly data were collected from the ward admission/discharge book that was maintained by a ward clerk and nursing staff. Case records were retrieved from the hospital records unit using information obtained from the ward admission book.

Audit meetings were initially sporadic but became more regular from November 2005 with good attendance and participation from medical staff.

Results

Baseline data

A total of 1 498 patients was admitted in the five months reviewed during 2005. There were 137 deaths giving a case fatality rate of 9.1%.

Edendale Hospital	*5 months of 2005*
Total admissions	1498
Total deaths	137
Case fatality rate (%)	9.1
Total modifiable factors	298
Modifiable factor rate (per death)	2.2

Information about children who died

Demographics

Age	*5 months of 2005 (% of all deaths)*
0-1 month	1.5
1 month-1 year	53.3
1-5 years	25.5
5-13 years	19.7
Total	100

Social context

Primary caregiver	*5 months of 2005 (% of all deaths)*
Mother	53.8
Grandmother	18.2
Father	1.5
Other	4.5
Unknown	22.0
Total	100

Mother's wellbeing	*5 months of 2005 (% of all deaths)*
Alive and well	56.9
Dead	6.6
Sick	5.1
Unknown	31.3
Total	100

Health context

NUTRITION

Weight	*5 months of 2005 (% of all deaths)*
Overweight	1.5
Normal	18.5
UWFA	19.2
Severe malnutrition	50.0
Unknown	10.8
Total	100

HIV/AIDS

At Edendale Hospital, 58% of children who died were either HIV-infected or HIV-exposed.

Laboratory category	*5 months of 2005 (% of all deaths)*
Negative	4.4
Exposed	20.4
Infected	38.0
Unknown	37.2
Total	100

Clinical HIV staging	*5 months of 2005 (% of all deaths)*
Stage I	1.5
Stage II	2.9
Stage III	27.0
Stage IV	33.6
Not staged / Unknown	20.0
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*5 months of 2005 (% of all deaths)*
NVP given	5.8
NVP not given	4.4
Mother negative	5.8
Unknown	83.9
Total	100

Inpatient mortality

The case fatality rates for the five months according to various parameters are tabulated below.

	Admissions (no.)	*Deaths (no.)*	*Case fatality rate (%)*
All admissions	1498	137	9.1
0-1 month	8	2	25.0
1-12 months	672	73	10.9
1-5 years	555	35	6.3
5-13 years	263	27	10.3

Causes of child deaths

Main diagnosis	*5 months of 2005 (% of all deaths)*
Pneumonia, ARI	26.3
Acute diarrhoea, hypovolaemic shock	18.3
Chronic diarrhoea	14.6
Septicaemia, possible serious bacterial infection	8.0
Other (specify)	5.1
Meningitis: bacterial	3.7
TB: Meningitis	3.7
PCP (suspected)	3.7
AIDS	2.2
TB: Pulmonary	1.5
Myocarditis	1.5
Non accidental injury, abuse related, neglect	0.7
Other respiratory failure (specifiy)	0.7
PCP (suspected or confirmed)	0.7
Heart failure, Pulmonary Oedema	0.7
Ill-defined/ unknown causes/ no info	0.7
Acute nephritic	0.7
TB: Miliary, other extra pulmonary	0.7
Pneumothorax, Pyothorax, Pleural effusion	0.7
RHD, Rheumatic fever	0.7
Total	100

Additional to the main cause of death, the Child PIP system allows one to enter other important diagnoses associated with the death. When adding up all causes of deaths and important diagnoses the following were identified as most common:

All diagnoses: top 5	*Main*	*Other*	*Total*	*Percent*
Pneumonia, ARI	36	10	46	20.5
Acute diarrhoea, hypovolaemic shock	25	11	36	16.1
Chronic diarrhoea	20	5	25	11.2
Septicaemia, possible serious bacterial infection	11	14	25	11.2
TB: Pulmonary	2	11	13	5.8

Information about quality of child healthcare

Records	*5 months of 2005 (% all deaths)*
Folder not available	8.8
Folder available: incomplete and/or inadequate	48.2
Folder available: OK	28.5
Unknown	14.6
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*5 months of 2005 (% of MFs)*
Home	28.2
Primary health clinic	8.4
Admission & Emergency care	16.8
Ward	27.2
Other	19.5
Total	100
Modifiable factors: who?	*5 months of 2005 (% of MFs)*
Caregiver and family	36.6
Administrator	8.7
Clinical personnel	54.7
Total	100

Discussion

About children who died

Most deaths occurred in children under one year of age and within 72 hours after admission.

HEALTH CONTEXT

Severe malnutrition remained an enormous challenge with one out of two of deaths being severely malnourished.

In only 5% of children was a negative HIV test recorded but there was a high percentage with unknown data. Over 60% were classified with Stage III or IV HIV disease yet only 1% were recorded as being on ART.

CAUSES OF DEATH

Acute respiratory infections and diarrhoeal disease caused the majority of deaths. There was a high prevalence of HIV, TB and malnutrition.

About quality of child healthcare

Poor records and record keeping constituted a major problem at Edendale Hospital. The ward admission/discharge book was in poor condition with pages missing and records incomplete. Admissions and discharges were recorded as separate entries on separate pages making it difficult to retrieve the information needed. The hospital filing system was chaotic and retrieval of case notes was time consuming and frustrating. The case notes themselves were of very variable quality and often very difficult to interpret.

Frequent rotation of nursing and medical staff was problematic and the disregard for following the proper referral pattern resulted in work overload.

Conclusion

Edendale Hospital struggles for many reasons. It serves a population where almost two-thirds come from rural areas that have high levels of un-employment, illiteracy and poverty. The hospital itself is an unsatisfactory facility and the building requires constant maintenance. It is hoped that the Child PIP process will be able to assist in the long-term, in improving the quality of care given to children in the institution.

GJ Crookes Hospital

Introduction

GJ Crookes Hospital is situated in Scottburgh about 50 km south of Durban and serves the rural community of Ugu-North Health District. Based on the National Census 1996, the district has a population of approximately 650 000.

GJ Crookes is a 300 bed district hospital that provides level 1 and 2 care and it is a referral centre for 16 fixed clinics, 4 mobile clinics and 2 school health teams. It has a walk-in primary healthcare (PHC) clinic and outpatient department, and offers a 24-hour accident and emergency service. The department of paediatrics includes 10 beds in the neonatal nursery and 51 beds in the mixed medical and surgical paediatric ward. One principal medical officer is primarily responsible for the paediatric ward, but also assists in the general outpatient department. A paediatrician visits the hospital once a month.

Methods

Child PIP started in June 2004. During 2005, the doctor and sister in-charge of the paediatric ward collected data mainly by using the standard admission and discharge register, monthly tally sheet and child death data capture sheet. All infants and children between the age of one month and eight years, who were admitted to the paediatric ward, were included in the study. Neonates were excluded because neonatal deaths were audited with the Perinatal Problem Identification Programme.

Mortality and morbidity meetings were held on the first Wednesday of every month. On average three doctors and seven nurses attended these meetings.

Results

Baseline data

A total of 1 506 patients was admitted from January to December 2005. There were 142 deaths giving a case fatality rate of 9.4%.

GJ Crookes Hospital	*2005*
Total admissions	1506
Total deaths	142
Case fatality rate (%)	9.4
Total modifiable factors	428
Modifiable factor rate (per 100 deaths)	3.0

Information about children who died

Demographics

Age	*2005 (% of all deaths)*
1 month-1 year	55.6
1-5 years	32.5
5-13 years	11.9
Total	100

Social context

Primary caregiver	*2005 (% of all deaths)*
Mother	85
Grandmother	15
Total	100
Mother's wellbeing	***2005 (% of all deaths)***
Alive and well	75
Dead	13
Sick	5
Unknown	7
Total	100

In about half of the cases the information about the father was not available, and of the rest 4% were dead and 2% were reported sick.

Health context

NUTRITION

Weight	*2005 (% of all deaths)*
Normal	41.5
< 3rd centile	56.2
Unknown	2.3
Total	100

HIV/AIDS

At GJ Crookes Hospital, 56% of children who died were either HIV-infected or HIV-exposed.

Laboratory category	*2005 (% of all deaths)*
Negative	5
Exposed	37
Infected	19
Unknown	39
Total	100
Clinical HIV staging	*2005 (% of all deaths)*
Stage I	9
Stage II	10
Stage III	30
Stage IV	20
Not staged / Unknown	31
Total	100

Inpatient mortality

The case fatality rates for various parameters are tabulated below.

	Admissions (no.)	*Deaths (no.)*	*Case fatality rate (%)*
All admissions	1506	142	9.4
1-12 months	661	79	11.9
1-5 years	641	46	7.2
5-13 years	204	17	8.3
Under-5 admissions			
Nutritional status:			
< 3rd centile	322	72	22.3
Illness:			
ARI	403	48	11.9
DD	391	32	8.2

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
Pneumonia	33.8
Diarrhoeal disease	22.6
Tuberculosis	19.0
Septicaemia	12.7
Meningitis	4.9
Other	7.0
Total	100

Information about quality of child healthcare

Records	*2005 (% all deaths)*
Folder not available	9
Folder available: incomplete and/or inadequate	23
Folder available: OK	67
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible. When analysing modifiable factors the principle used was that "if it was not written down, it was not done".

Modifiable factors: where?	*2005 (% of MFs)*
Home	23
Primary health clinic	14
Admission & Emergency care	32
Ward	31
Total	100
Modifiable factors: who?	*2005 (% of MFs)*
Caregiver and family	23
Administrator	17
Clinical personnel	60
Total	100

Caregiver-related modifiable factors:

Modifiable factors related to delay in seeking healthcare occurred in 29% of cases, and in a quarter of cases children received inappropriate nutrition. In 13% of cases, the caregiver did not realise the severity of illness and 10% of caregivers denied their children testing for HIV.

Administrative modifiable factors:

The most common administrative modifiable factors related to the availability and maintenance of medical equipment. In 60% of cases, the equipment was either not available or it was broken and being repaired. For instance, a blood gas analysis machine was not available (8%), a pulse oxymeter broken (7%), BP apparatus out of order (3%), BP apparatus present but no paediatric cuff (10%), weighing scale broken (5%), IVAC present but no giving set (6%) and ventilator broken and gone for repair for more than 4 months. Lack of personnel entailed lack of doctors and professional nurses, especially during the night or weekends. Some patients (16%) had transport problems and a few problems (3%) related to communication were also identified.

Clinical personnel:

Multiple modifiable factors related to clinical personnel at all levels. Main modifiable factors in the different areas were:

- PHC: Poor case assessment and management.
- Admission and Emergency care: Incomplete history and physical examination; inappropriate treatment initiation; inappropriate treatment of shock and basic investigations not being done.
- Ward: Inappropriate fluids and electrolyte management.

Discussion

About children who died

HEALTH CONTEXT

The condition of the patients on admission was very poor i.e. chronically ill children with late presentations; diarrhoea with severe dehydration and irreversible shock plus malnutrition; pneumonia with PCP plus pulmonary TB; and HIV/AIDS, of which most of the children were not yet included in the ART programme.

There was poor follow-up for babies receiving nevirapine in the PMTCT programme. Hence, most of the babies were not tested at six weeks of age and did not receive cotrimoxazole prophylaxis. Paediatric ART roll-out has been amalgamated into the adult Drop-in-Centre (DIC) and there was no regular communication between the staff of the paediatric ward and the DIC. Counsellors counsel mothers at the bedside with no concern about their privacy. Testing a child for HIV was still a major problem in the hospital. The common reasons cited by the lay counsellors for not testing children included: parents not available during working hours; and mother not yet ready for testing or mother needing to first discuss testing with the father of the child. Most mothers were not tested at the time of delivery, which showed that there was poor health education at the ANC clinic and poor nevirapine delivery in the maternity department.

The hospital depends totally upon the community service dietician, and with the high level of staff rotation each year the procedures for the management of children with malnutrition are changed.

INPATIENT MORTALITY

Child PIP in GJ Crookes started as Under-5 PIP in June 2004, so only six months data were available for comparison with 2005. The case fatality rate for the last 6 months of 2004 was 9.2 and the case fatality rate for the last 6 months of 2005 was 9.2. This showed that the factors affecting the mortality of children are constant in their occurrence and have not yet been modified.

CAUSES OF DEATH

The most common causes of death, like elsewhere in the province, were pneumonia, DD, pulmonary tuberculosis, septicaemia and meningitis. These problems have been further compounded by the HIV/AIDS epidemic, as well as poverty, teenage pregnancy and breakdown of families, which may lead to high prevalence of severe malnutrition and delay in seeking care. Stigma and denial often leads to poor PMTCT and VCT.

About quality of child healthcare

In the health system, major problems were identified with assessment, monitoring, and management of sick children. The ward remained busy and there were large numbers of deaths. The medical officer was available to do the morning ward round and thereafter the on-call doctor had to be called for emergency cases. Thus, nursing staff took care of the ward patients during most of the day and night. During 2005, two babies died in the outpatient department while waiting to be seen by a doctor. There was no separate cubical or queue for very sick children. A triaging system has been introduced recently, but has not been very successful yet.

In the category of inpatient care, more than 50% of the modifiable factors identified related to fluid and electrolyte management. The main reasons were poor in-service training and frequent rotation of nursing staff.

Language is one of the factors responsible for poor communication between the patients, therapists and medical staff. Most medical staff and therapists do not understand the main language spoken by the community of this district (i.e. isiZulu). In a recent informal survey in the institution it was found that about two-thirds of the medical staff and none of the therapists were able to communicate in isiZulu with the patients. This problem has been partially overcome by the availability of student nurses who help with translation. However, the quality of the translation may vary, which may affect patient care.

The quantity of available equipment was far less than the requirement per number of beds in the ward, which resulted in frequent unavailability due to malfunctions. In addition, the repair of equipment took many months. The hospital has an 'institutional equipment pool' but no equipment. There was poor and interrupted supply of daily-use items. Something was always out of stock and it took months for the vital things to become available. Drugs and IV fluids were generally available throughout the year.

Solutions

- Intensify the paediatric ART rollout: ensure that it is separate from the adult rollout.
- Appoint a permanent dietician to ensure quality and consistency in the management of malnourished children.
- Start an in-service basic isiZulu literacy programme for therapists and medical staff, to help facilitate communication with the patients.
- Provide separate consultation rooms for paediatric patients in the outpatient department to reduce the waiting time for sick children.
- Recognise the paediatric ward as a high care department and minimise the rotation of nursing staff.
- Retain a full-time paediatric doctor in the paediatric ward to improve quality of care for sick children. This would help with the support of nursing staff, setting up standards of patient management and smooth running of the Child PIP programme.
- Establish and maintain the institutional equipment pool, provide sufficient stock and reduce the equipment repair time.
- Intensify in-service training of the medical and nursing staff. Ensure participation of part-time doctors in the mortality meetings and continuing medical education activities of the hospital.

- Identify and address the problems in admitting and stores department, and improve the morale of the existing staff.
- Promote IMCI guidelines for doctors and nurses. Establish an IMCI training site within the hospital for training of the hospital and clinic staff.
- Identify and address the problems of nurses by conducting a survey in the institution and developing a comprehensive plan to retain the experienced nursing staff.
- Optimize PHC clinics with better equipment and skilled staff, 24 hours a day, to reduce the load in the hospital.

Conclusion

Overall, mortality meetings were a good learning and quality improvement experience for all the staff, but running Child PIP was very challenging at GJ Crookes Hospital. The main reasons were shortage of staff and lack of interest and support from the medical and nursing staff. Most of the ChIP work took place after hours, during weekends and public holidays. It is therefore suggested that Child PIP should be hospital-run rather than dependent on an individual. Final results of data analysis for the year 2005 and the above-mentioned recommendations were presented to staff and the management of GJ Crookes at the first annual Child PIP Meeting held in February 2006, with the hope that it would assist in addressing the problems identified.

Grey's Hospital

Introduction

Grey's Hospital is a 485 bed tertiary (level 3) hospital that serves the western half of KwaZulu-Natal. The tertiary catchment population is approximately 3,5 million and this population is served by 16 district hospitals and 3 regional hospitals. All these hospitals refer to Grey's Hospital. Hospital-based inpatient statistics for 2005 revealed that three-quarters of all patients admitted are referred from this tertiary catchment area. The staff complement for medical paediatric patients at Grey's Hospital consists of 4 paediatricians, 4 registrars, 3 medical

officers and 3 interns for a 30 bed general ward, a 6 bed high care unit, a 4 bed paediatric ICU and a 30 bed neonatal intensive care unit.

Methods

All medical staff in the paediatric department attended audit meetings held for an hour every Wednesday morning. All paediatric medical deaths from the previous week were reviewed. This weekly system, with the completed Child PIP mortality forms being reviewed by all levels of medical staff has now become routine. However, no nursing or allied professional staff contributes to these meetings as yet.

The data reviewed was for the period from January to December 2005.

Results

Baseline data

A total of 1 079 patients was admitted during 2005. There were 107 deaths giving a case fatality rate of 9.9%.

Grey's Hospital	***2005***
Total admissions	1079
Total deaths	107
Case fatality rate (%)	9.9
Total modifiable factors	284
Modifiable factor rate (per death)	2.7

Information about children who died

Demographics

Age	***2005 (% of all deaths)***
1 month-1 year	44.1
1-5 years	27.5
5-13 years	28.4
Total	100

Over a third of the deaths analysed took place within the first 24 hours after admission to Grey's Hospital. This was unchanged from 2004 where 33% of all child admissions died within 24 hours.

Social context

Primary caregiver	***2005 (% of all deaths)***
Mother	66.7
Grandmother	9.8
Other	7.8
Unknown	15.7
Total	100
Mother's wellbeing	***2005 (% of all deaths)***
Alive and well	66.7
Dead	6.9
Sick	4.9
Unknown	21.6
Total	100

Health context

NUTRITION

Weight	*2005 (% of all deaths)*
Overweight	1.0
Normal	31.4
UWFA	26.5
Severe malnutrition	24.5
Unknown	16.6
Total	100

HIV/AIDS

At Grey's Hospital, 46% of children who died were either HIV-infected or HIV-exposed.

Laboratory category	*2005 (% of all deaths)*
Negative	23.5
Exposed	13.7
Infected	32.4
Unknown	30.4
Total	100
Clinical HIV staging	***2005 (% of all deaths)***
Stage I	2.0
Stage II	2.9
Stage III	10.8
Stage IV	13.7
Not staged / Unknown	70.6
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*2005 (% of all deaths)*
NVP given	2.9
NVP not given	6.9
Mother negative	14.7
Unknown	75.5
Total	100

Inpatient mortality

The case fatality rates for various parameters are tabulated below.

	Admissions (no.)	*Deaths (no.)*	*Case fatality rate (%)*
All admissions	1079	107	9.9
1-12 months	302	47	15.6
1-5 years	372	30	8.1
5-13 years	362	29	8.0
Under-5 admissions			
Nutritional status:			
< 3rd centile	154	9	5.8
Illness:			
ARI	122	19	15.6
DD	46	5	10.9

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
Septicaemia, possible serious bacterial infection	24.1
Pneumonia, ARI	17.1
Other (specify)	13.0
Acute diarrhoea, hypovolaemic shock	8.0
Meningitis: bacterial	6.0

Information about quality of child healthcare

Records	*2005 (% all deaths)*
Folder not available	6.9
Folder available: incomplete and/or inadequate	49.0
Folder available: OK	43.1
Unknown	1.0
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*2005 (% of MFs)*
Home	20.5
Primary health clinic	13.2
Admission & Emergency care	21.2
Ward	26.0
Other	19.0
Total	100
Modifiable factors: who?	*2005 (% of MFs)*
Caregiver and family	28.6
Administrator	12.1
Clinical personnel	59.3
Total	100

Discussion

About children who died

HEALTH CONTEXT

This high proportion of HIV-related deaths (46%) for a referral hospital confirms its situation in an area with very high HIV sero-prevalence. It also suggests that HIV mortality does not differ with differing levels of care. The assumption that HIV-positive children clinically stage III or IV will be excluded from referral for higher levels of care may not be true.

Despite the high association of all mortality with HIV disease, analysis of the deaths shows poor clinical staging of HIV disease. This is significant, as clinical staging forms one of the entry points for the assessment of eligibility for antiretroviral treatment.

INPATIENT MORTALITY

Although marginally down from 2004 (CFR 12), the under-5 case fatality rate of 11.4 for 2005 at Grey's Hospital is high. This high CFR reflects the referral policy becoming more entrenched with much sicker children being referred. The expansion and development of the paediatric high care and ICU facilities have also resulted in more complicated cases being referred. Children who did not qualify for ventilation or who could be managed at a level one hospital were excluded from admission.

CAUSES OF DEATH

The above admission policy would account for sepsis syndrome being the commonest cause of death at Grey's Hospital as opposed to ARI (especially PCP) and DD as found in level one and two hospitals.

About quality of child healthcare

The high rate of inpatient modifiable factors particularly at Ward level and A&E level indicates a need for improved stabilisation of patients prior to transfer as well as increased senior cover for high care and ICU patients. Most senior or experienced cover was diverted to neonatal care, especially after-hours. The continued high rate of children dying soon after being transferred warrants evaluation of referral policies, particularly the stabilization of sick children prior to transfer, as well as improved communication with and quality of emergency transport units.

Despite the expected effects of the HIV pandemic on mortality and the now widespread availability of antiretroviral therapy, a large number of HIV-associated deaths were not clinically staged. Innovative tools need to be developed to ensure medical personnel stage each child and thus help speed up the process for HIV-infected children gaining access to ART.

Solutions

Despite the dire shortage of trained nursing and medical staff, the following strategies based on the analysis of Child PIP mortality data could be implemented.

- Improve the transfer of acutely ill children to Grey's Hospital. Develop a standardised transfer log, and evaluate and assess all referred cases according to the norms as indicated in the transfer log. Include guidelines for stabilisation of ill children in this log as this would help ensure the survival of children accepted to Grey's Hospital from all referral sites. It would

serve to entrench communication with emergency medical transport units for ensuring optimal transfer and improved preparation for the receipt of ill patients.

- Improve quality of care by introducing a standard HIV staging form for all admissions. This would help ensure all children are staged for HIV and would speed up access for those eligible for ART, as well as improved management for those who are not.
- Include nursing staff in the weekly audit of all deaths.
- Present information gathered from the weekly audits and annual reviews of mortality to hospital, nursing, emergency medical transport and antiretroviral treatment programme managers.

Conclusion

Child PIP has been useful in identifying problems and providing supporting data. In this way, possible solutions have been identified. These will be implemented from July 2006, and review of the July to December 2006 Child PIP data could be used to assess if the envisaged significant improvements in quality of care have occurred.

Mahatma Gandhi Memorial Hospital

Introduction

Mahatma Gandhi Memorial Hospital (MGMH) is situated approximately 30 km north of Durban in the eThekwini District. The catchment area includes Inanda, KwaMashu, Phoenix, Umhlanga Rocks, Verulam and surrounds. The estimated catchment population is 1 to 1.2 million. The population is rural, peri-urban and metropolitan and approximately 20 primary healthcare clinics and 5 community health centres, as well as the Osindisweni Hospital (district level) serve the area.

MGMH is a regional hospital with 35 beds which are mixed medical/surgical (approximately 10% of all admissions are surgical i.e. burns, fractures, trauma, and cellulitis). The nursing staff complement

is inadequate, with an estimated 30-40% of hospital posts, particularly for professional nurses, being empty. Paediatric trained nurses are in extremely short supply. The medical staff consists of three consultants (one in ward, one covering POPD and ward, and one in the 25 bed nursery/NICU), two registrars and two interns/medical officers.

Methods

Data collection was from 1 January to 31 December 2005, including all paediatric admissions and deaths but excluding those deaths that occurred in casualty and all dead-on-arrival patients.

The doctor filling in the death certificate or alternatively, the doctor who was caring for the patient at that time completed Child PIP forms. This process was problematic because doctors did not always complete the forms as required. Many forms were filled in retrospectively after requesting charts from the mortuary. This process has improved but is still problematic.

Audit meetings lasting over an hour were held monthly in the department, with all staff attending. The statistics were presented and discussed, and the consultant selected some cases for in-depth discussion. Clinical management, as well as processes in the ward/hospital, were reviewed and corrected in an atmosphere of learning; and action plans to improve care were devised and implemented. No nursing or administration staff attended the meetings.

Results

Baseline data

Mahatma Gandhi Memorial Hospital	*2004*	*2005*
Total admissions	2936	2302
Total deaths	173	190
Case fatality rate (%)	5.9	8.3
Total modifiable factors	1)	294
Modifiable factor rate (per death)	1)	1.5

1) No data

Information about children who died

Demographics

Age	*2005 (% of all deaths)*
0-1 month	9.6
1 month-1 year	56.4
1-5 years	25.0
5-13 years	9.0
Total	100

Social context

Primary caregiver	*2005 (% of all deaths)*
Mother	16.6
Grandmother	0.5
Father	0.5
Unknown	82.4
Total	100
Mother's wellbeing	***2005 (% of all deaths)***
Alive and well	16.0
Dead	1.6
Sick	1.6
Unknown	80.8
Total	100

Health context

A large proportion of data is missing in the following tables either because it was not recorded on the ChIP form (majority) or not recorded in the patients' folders. Significant improvement is required in this area as such a lack of data makes interpretation of the information difficult.

NUTRITION

Weight	***2005 (% of all deaths)***
Normal	8.1
UWFA	8.6
Severe malnutrition	3.8
Unknown	80.5
Total	100

HIV/AIDS

At MGM Hospital, only 13% of children who died were either HIV-infected or HIV-exposed although the HIV status of the majority was unknown.

Laboratory category	***2005 (% of all deaths)***
Negative	1.1
Exposed	11.2
Infected	1.6
Unknown	85.7
Total	100
Clinical HIV staging	***2005 (% of all deaths)***
Stage I	11.2
Stage II	13.9
Stage III	34.2
Stage IV	4.3
Not staged / Unknown	36.4
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*2005 (% of all deaths)*
NVP given	1.6
NVP not given	2.7
Mother negative	1.1
Unknown	94.7
Total	100

Inpatient mortality

The case fatality rates for various parameters are tabulated below.

	Admissions (no.)	*Deaths (no.)*	*Case fatality rate (%)*
All admissions	2302	190	8.3
0-1 month	170	18	10.6
1-12 months	850	106	12.5
1-5 years	740	47	6.4
5-13 years	457	17	3.7

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
Pneumonia, ARI	24.6
Acute diarrhoea, hypovolaemic shock	18.7
Septicaemia, possible serious bacterial infection	16.0
PCP (suspected or confirmed)	13.4
Chronic diarrhoea	6.4

All diagnoses: top 5	*2005 (% of all deaths)*
Pneumonia, ARI	19.9
Acute diarrhoea, hypovolaemic shock	13.8
Septicaemia, possible serious bacterial infection	11.0
Other serious infection	8.9
PCP (suspected)	6.6

Information about quality of child healthcare

Records	*2005 (% all deaths)*
Folder not available	6.4
Folder available: incomplete and/or inadequate	6.9
Folder available: OK	8.5
Missing data	78.2
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*2005 (% of MFs)*
Home	29.5
Primary health clinic	19.6
Admission & Emergency care	34.9
Ward	16.0
Total	100
Modifiable factors: who?	*2005 (% of MFs)*
Caregiver and family	30.0
Administrator	40.7
Clinical personnel	29.3
Total	100

Discussion

About children who died

HEALTH CONTEXT

The Child PIP statistics from MGMH reflect a society that is largely in the low income category and has only 1 regional hospital (MGMH) and 1 district hospital (50 paediatric beds) serving the population which is estimated to be one-third of the entire eThekwini District.

The HIV pandemic has influenced the statistics, but how and to what extent was difficult to conclude from current data. Hopefully, by continuing Child PIP in 2006, a clearer picture will be obtained. Many patients were either not tested for HIV or did not have their results, which made interpretation of the data difficult. It was hoped that this situation would improve with the advent of PCR testing in mid-2005. The ART clinic at the hospital has recently started and with the increased capacity expected in 2006, expansion of this service should be possible. However, it must be noted that beds may be needed for patients with ART-related complications such as the Immune Reconstitution Syndrome, as seen in other centres.

INPATIENT MORTALITY

The CFR at MGMH was 8.3% for 2005. This has increased from 5.9% in 2004. The reason for this was not readily apparent, as the number of admissions had decreased and medical staff increased. There were however more junior staff in all categories in 2005 as compared to 2004.

CAUSES OF DEATH

The HIV pandemic definitely affects the cause of death profile, as PCP, pneumonia and acute/chronic gastroenteritis were common among HIV-infected patients. It was clear in both main and all diagnoses, that pneumonia/ARI (including PCP), DD and

septicaemia/other serious infections were the top three causes that required attention.

Tuberculosis did not feature among the top three causes but it remained a problem. The TB programme needs to be evaluated separately to make a more informed assessment at MGMH.

About quality of child healthcare

In the caregiver category, delay in seeking care (38.6%) was the most prevalent modifiable factor. The provision of health education to the community will help to enable early identification of danger signs. A list similar to that in the IMCI programme used at immunisation clinics may be useful. The problem of delay in seeking care however, may be more complex and poor access to healthcare facilities for the population in this area is probably very significant. The KwaZulu-Natal Department of Health have recently approved budgets for the development of two new district hospitals, one in Kwa-Mashu and one in Inanda. This would improve access and may improve delay in seeking care. However, poverty alleviation and transport infrastructure, together with staffing for these hospitals are also critical.

In the health system category, the most prevalent modifiable factor (22.4%) was the lack of resuscitation areas, high care and PICU facilities. A paediatric resuscitation unit, functioning as a 24-hour short stay unit, with adequate staff and equipment could solve this problem. Acute admissions could be more carefully managed in the initial phase and then transferred to the ward in a more stable condition. This would also improve the number of deaths that occurred in the first 24 hours, as 37.4% of all deaths occurred in that time in 2005, with 32.6% of deaths occurring within 1-3 days of admission. It is clear that provision of these facilities would make a significant impact on healthcare provided. Planning and developing this area in the paediatric department should be the responsibility of the paediatric and hospital management team at MGMH, and should be a priority in the hospital's five-year strategic plan. As an immediate interim solution, space in the casualty should be designated for this service.

Solutions

- Improve caregiver-related factors by implementing an education programme directed at the community, leading to improvements in caregiver-related modifiable factors as recorded by Child PIP.

- Improve hospital-related factors by establishing a resuscitation unit. Planning must include a feasible development schedule. The ART clinic is receiving attention and its impact will have to be monitored.

Conclusion

The Child PIP audit process is essential in order to prioritise scarce resources and to optimise patient care. It helps identify areas that require urgent attention.

However, the process is dependent on the quality of data collection. This has been problematic as not all members of the paediatric team gave their full commitment to the process and some may have seen it as a burden in a busy unit. This impression would change if concrete changes occurred because of ChIP data. It is therefore important to present the information gathered during 2005 to management to enable tangible improvements to be made in the near future. Such successes would hopefully foster confidence and increase support among staff. Starting the Child PIP process has been time consuming, but although sustaining it should take less time, it may need more effort.

Free State

Metsimaholo Hospital

Introduction

Metsimaholo Hospital is a rural hospital situated in the northern Free State and serving a population of 116 000 (of which 10% are under-5 years old). Eight provincial clinics, including a community health centre and three mobile clinics, are located in the nearby town of Sasolburg. Metsimaholo is an 82 bed hospital with 6 medical officers, 3 community service doctors and 3 part-time doctors. Admissions of children range between 40 and 90 per month in a mixed surgical and medical ward. No paediatrician is available full- or part-time.

Child PIP was introduced in 2004 to identify areas where child care could be improved.

Methods

Data collection ranged from January to December 2005. Only medical admissions and deaths were reported for the age group 1 month to 13 years of age. Data were captured on the death data capture sheets during audit meetings and then entered into the ChIP computer programme.

Audit meetings were held every one to two months. The medical officer from the provincial office conducted the meetings. Nursing staff from the paediatric, casualty and maternity wards attended the meetings enthusiastically. The number of doctors attending varied from one to five. Doctors in Metsimaholo Hospital work in all departments and therefore the more doctors available, the more useful the discussion. Other attendees were the IMCI co-ordinator of the district and clinical head of Metsimaholo Hospital. A convenient duration of the meeting was one hour, however data capturing often took much longer and therefore had to be done by a few remaining nurses and the provincial representative which of course was less desirable.

Results

Baseline data

Metsimaholo Hospital	*2004*	*2005*
Total admissions	841	1014
Total deaths	50	61
Case fatality rate (%)	5.9	6.0
Total modifiable factors	375	186
Modifiable factor rate (per death)	7.5	3.0

Information about children who died

Demographics

Age	*2005 (% of all deaths)*
1 month-1 year	70.5
1-5 years	19.7
5-13 years	9.8
Total	100

Length of stay	*2005 (% of all deaths)*
< 24 hours	37
1-3 days	20
4-7 days	28
8-14 days	10
> 14 days	5
Total	100

Social context

Mother's wellbeing	*2005 (% of all deaths)*
Alive and well	26
Dead	7
Sick	10
Unknown	57
Total	100

Health context

NUTRITION

Weight	*2005 (% of all deaths)*
Normal	31
UWFA	28
Severe malnutrition	33
Unknown	8
Total	100

HIV/AIDS

At Metsimaholo Hospital, 21% of children who died were either HIV-infected or HIV-exposed although the HIV status of the majority was unknown.

Laboratory category	*2005 (% of all deaths)*
Negative	1.6
Exposed	9.8
Infected	11.5
Unknown	77.0
Total	100
Clinical HIV staging	*2005 (% of all deaths)*
Stage I	3.3
Stage II	6.6
Stage III	8.2
Stage IV	21.3
Not staged / Unknown	60.7
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*2005 (% of all deaths)*
NVP given	1.6
NVP not given	4.9
Mother negative	0
Unknown	93.4
Total	100

Inpatient mortality

The case fatality rates for various parameters are tabulated below.

	Admissions (no.)	*Deaths (no.)*	*Case fatality rate (%)*
All admissions	1014	61	6.0
0-1 month	6	0	0.0
1-12 months	578	43	7.4
1-5 years	258	12	4.6
5-13 years	172	6	3.4

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
Pneumonia, ARI	32.8
PCP (suspected or confirmed)	18.0
Acute diarrhoea, hypovolaemic shock	14.8
Septicaemia, possible serious bacterial infection	11.5
Tumours/leukaemias	4.9

All diagnoses: top 5	*2005 (% of all deaths)*
Pneumonia, ARI	31.0
PCP (suspected or confirmed)	17.9
Acute diarrhoea, hypovolaemic shock	14.3
Septicaemia, possible serious bacterial infection	9.5
Tumours/Bacterial meningitis/Other	3.6

Information about quality of child healthcare

Records	*2005 (% all deaths)*
Folder not available	0
Folder available: incomplete and/or inadequate	46
Folder available: OK	54
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*2005 (% of MFs)*
Home	8.6
Primary health clinic	0.6
Admission & Emergency care	54.0
Ward	33.3
Other	3.4
Total	100
Modifiable factors: who?	*2005 (% of MFs)*
Caregiver and family	8.6
Administrator	7.5
Clinical personnel	85.6
Total	100

Discussion

About children who died

Although the total number of patients admitted as well as the number of deaths increased in 2005, it must be noted that children up to 13 years were included in this audit, whereas only the under-5 deaths were audited in 2004.

A considerable number (37%) of children died within 24 hours of admission. This could reflect late recognition of the severity of an illness by the caregiver, or previous discharge without appropriate treatment. More children (67%) died during the night or during weekends than during weekdays.

HEALTH CONTEXT

Malnutrition was a contributory factor in 61% of deaths, with 33% having severe malnutrition.

The HIV laboratory and clinical status of children who died was regrettably unknown in the majority of cases, which posed a problem as PMTCT involvement, cotrimoxazole prophylaxis and ART subsequently could not be appropriately accessed.

INPATIENT MORTALITY

The case fatality rate of 6% for all admissions in 2005 remained much the same as in 2004 (5.9%). However the CFR for the under-5 year

olds, if assessed separately, increased to 6.5% and this provides a better comparative value. The highest CFR was in the group one-month to one-year (7.4%).

CAUSES OF DEATH

Causes of death were similar to the rest of the country, with a high incidence of pneumonia and PCP, as well as septicaemia and diarrhoea.

About quality of child healthcare

More than half of the modifiable factors occurred in casualty (A&E) and most were ascribed to clinical personnel (86%). The clinical personnel factors most frequently recorded were: Appropriate investigations not done; incomplete history taking; incomplete physical examination; and appropriate antibiotics not prescribed. Possible reasons for these were that no specific doctor was responsible for the paediatric ward, no follow-up on serious cases admitted was done except during the routine ward round, there was a lack of knowledge/commitment from doctors revealed by poor notes and management, and no senior opinion regarding difficult cases was available..

Solutions

- One medical officer should be responsible for the paediatric ward for a period of at least three months.
- Red flag seriously ill patients over weekends or after hours.
- Follow up investigations.
- Communicate with senior doctors on difficult cases.
- More doctors should attend the Child PIP audit to understand the nature of the problems.
- Management must be involved in the implementation of Child PIP.

Conclusion

The Child PIP programme was an extremely helpful tool in identifying problem areas in Metsimaholo Hospital and it is hoped that it will provide guidance for improved practice.

The input from all Child PIP role-players and the national co-ordinators was appreciated, as were the nursing sister-in-charge of the paediatric ward and her team who assisted with the implementation of Child PIP. The support for the piloting of Child PIP in Metsimaholo Hospital from the clinical head was valued and considered important.

National District Hospital

Introduction

National District Hospital (NDH) is located in Bloemfontein. It is a primary level hospital (district) associated with the academic complex in Bloemfontein. It serves a population of about 350 000 and treats patients from the southern Free State. The majority of patients live in an urban and peri-urban environment but there are also a significant amount of patients from rural settings.

Twenty-five outlying clinics in the Motheo/Mangaung district refer patients to the National District Hospital. Patients are also received from the secondary and tertiary hospitals for step-down care, especially stable premature babies who are received from these institutions for feeding and 'fattening up' before discharge. A family practitioner specialist from the Department of Family Medicine at the University of Free State supervises the paediatric ward. An intern and medical officer rotate through the ward. The ward has 27 beds, which are allocated in the following way: 3 for oncology (patients on radiotherapy), 6 general paediatric beds, 6 gastroenteritis beds, 6 incubators for premature babies, and 6 Kangaroo Mother Care beds.

Methods

The data were collected for the period 1 January to 31 December 2005. Admissions and deaths from 1-month to 13-year-olds were reported upon. The data on deaths was captured on the Child PIP death data capture sheets and then entered into the Child PIP software programme for analysis. Due to the development of the software package, repeated checks were performed on the data in order to ensure accuracy and correct conversions. Data were collected each month and the causes of death determined during a discussion of the cases with the staff rotating in the ward at the time. Avoidable factors

were deduced from going through the notes and the memories of the medical staff managing these patients. The family practitioner overseeing the children's ward managed the audit process.

Results

Baseline data

National District Hospital	*2005*
Total admissions	797
Total deaths	25
Case fatality rate (%)	3.1
Total modifiable factors	51
Modifiable factor rate (per death)	2.0

Information about children who died

Demographics

Age	*2005 (% of all deaths)*
1 month-1 year	40
1-5 years	52
5-13 years	8
Total	100

Length of stay	*2005 (% of all deaths)*
< 24 hours	40
1-3 days	16
4-7 days	16
8-14 days	20
> 14 days	8
Total	100

Social context

Primary caregiver	*2005 (% of all deaths)*
Mother	56
Grandmother	20
Unknown	24
Total	100
Mother's wellbeing	***2005 (% of all deaths)***
Alive and well	44
Dead	32
Sick	16
Unknown	8
Total	100

Health context

NUTRITION

Weight	*2005 (% of all deaths)*
Normal	0
UWFA	44
Severe malnutrition	56
Total	100

HIV/AIDS

At National District Hospital, 96% of children who died were HIV-exposed.

Laboratory category	*2005 (% of all deaths)*
Negative	0
Exposed	96
Infected	0
Unknown	4
Total	100
Clinical HIV staging	*2005 (% of all deaths)*
Stage I	0
Stage II	0
Stage III	76
Stage IV	20
Not staged / Unknown	4
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*2005 (% of all deaths)*
NVP given	8
NVP not given	74
Mother negative	0
Unknown	18
Total	100

Inpatient mortality

The case fatality rates for various parameters are tabulated below.

	Admissions (no.)	*Deaths (no.)*	*Case fatality rate (%)*
All admissions	797	25	3.1
0-1 month	220	1	0.4
1-12 months	274	9	3.2
1-5 years	227	13	5.7
5-13 years	76	2	2.6
Under-5 admissions			
Nutritional status:			
< 3rd centile	414	22	5.3
Illness:			
ARI	252	8	3.2
DD	170	9	5.3

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
Acute diarrhoea, hypovolaemic shock	32
Other serious infections (HIV)	20
Pneumonia, ARI	16
PTB and suspected PCP	16
Other	20

All diagnoses: top 4	*2005 (% of all deaths)*
AIDS	26
ARI	14
PTB	12
Chronic diarrhoea	12

Information about quality of child healthcare

Records	*2005 (% all deaths)*
Folder not available	0
Folder available: incomplete and/or inadequate	8
Folder available: OK	92
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*2005 (% of MFs)*
Home	82
Primary health clinic	6
Admission & Emergency care	4
Ward	8
Total	100
Modifiable factors: who?	*2005 (% of MFs)*
Caregiver and family	82
Administrator	4
Clinical personnel	14
Total	100

Discussion

About children who died

It is clear from these figures that the mortality rate of paediatric patients in National District Hospital was low at 3.1%, compared to 6.5% in other district hospitals. The adequate medical cover of the ward can explain this. Many of the children that died in the unit were terminal HIV patients and thus the modifiable factors focused mainly on the patient's home rather than the health facilities. This is in marked contrast to other district hospitals in the Free State.

SOCIAL CONTEXT

About one-third of the children dying in this facility were maternal orphans, the mothers having died. Unfortunately, information about the fathers was less well known.

HEALTH CONTEXT

National District Hospital paediatric ward is a facility where chronically ill children can be cared for and receive palliative care. The vast majority of the children that died in this facility were HIV-positive and

severely underweight or wasted on admission. The precipitating cause of death may have been acute-on-chronic diarrhoea, but the underlying cause in almost all was terminal AIDS.

PMTCT information was not available in a large proportion of patients but in only a few was documented evidence of nevirapine prophylaxis having been given at birth. Many children were fed a mixed diet of formula and breast milk despite the policy advising against this practice. Only a small number of children that died in NDH in 2005 had been on ART at the time of death. This has lead to a greater awareness of the need to place children on treatment.

About quality of child healthcare

The biggest challenge from the mortality profile at NDH was that efforts to prevent the transmission of HIV to neonates needed to be intensified. Too many children still slip through the net with regard to preventative programmes. More effort has been placed on identifying children that need to be put onto ART. This was initiated in the ward during 2005 after the analysis of the Child PIP mortality data.

Conclusion

The mortality profile of children at National District Hospital is unique because this facility caters for palliative care of HIV-infected terminally ill children. Not many children died of obvious acute infectious diseases as in many other health facilities. The results of the mortality data from National District Hospital highlight the importance of the prevention of mother-to-child transmission of HIV infection.

The members of the paediatric care team at National District Hospital are thanked for their efforts in looking after these children with much compassion. Few avoidable factors during the admission and inpatient management of these patients were found, and this is due to contributions of the dedicated service of this staff.

Northern Cape

Kimberley Hospital

Introduction

Kimberley Hospital is an 835 bed regional hospital providing secondary and some tertiary services to the Northern Cape, western Free State and south west of the North West Province. The hospital serves a population of 800 000 (90 000 children under 5 years) in the Northern Cape. A third of the population lives in the Francis Baard district in or around Kimberley. The province covers 28% of the surface area of South Africa. Distance is a major problem in healthcare delivery.

The paediatric department at Kimberley Hospital manages approximately 4 000 inpatients and 13 000 outpatients per year. Another 10 000 patients are seen by primary care nurses at Galeshewe Day Hospital in Kimberley. An outpatient clinic is run five days per week from 08h00-16h00. During office hours, this clinic also manages acute referrals.

Facilities at the hospital include an 8 bed neonatal high care unit where babies weighing more than 900 grams can be ventilated, a 6 bed paediatric high care unit that also offers ventilation, a 46 bed general paediatric ward, a 30 bed neonatal nursery, a 22 bed paediatric surgical unit and 6 private beds. Breastfeeding mothers are accommodated in a breastfeeding lodge and in a Kangaroo Mother Care unit.

There were 5 462 births in Kimberley Hospital, 930 neonatal admissions and 136 deaths in this group. These patients were not included in this report.

Staff consist of one full-time and two part-time paediatricians, two full-time and two part-time medical officers, three community medical officers (six-month rotation) and four interns (four-month rotation).

The paediatric department is also a satellite campus for post-graduate training for registrars (three to six months) from the University of Free State.

Methods

Morbidity and mortality meetings were held every morning Mondays to Thursdays before daily activities started. Approximately 12 doctors and 7 nurses from the wards attended these meetings and they lasted 30 to 45 minutes.

During the meeting all mortalities were discussed in detail. Final diagnosis was assigned and modifiable factors identified. The attending doctor was responsible for completing the audit form. The full-time paediatrician (author) was responsible for data capturing.

Results

Baseline data

Kimberley Hospital	*2004*	*2005*
Total admissions	3967	3887
Total deaths	193	166
Case fatality rate (%)	4.9	4.3
Total modifiable factors*	1)	323
Modifiable factor rate (per death)	1)	1.9

1) No data

* The author did not originally include modifiable factors relating to the home and family which have subsequently been included in the table

Information about children who died

Demographics

Age	*2005 (% of all deaths)*
< 1 year	58.4
1-5 years	32.5
5-13 years	8.4
13-18 years	0.6
Total	100

Social context

Primary caregiver	*2005 (% of all deaths)*
Mother	87.3
Grandmother	6.6
Father	0.6
Other	5.4
Total	100
Mother's wellbeing	***2005 (% of all deaths)***
Alive and well	81.3
Dead	4.8
Sick	7.2
Unknown	6.6
Total	100

Health context

NUTRITION

Weight	*2005 (% of all deaths)*
Normal	27.1
UWFA	33.1
Severe malnutrition	36.7
Unknown	3.1
Total	100

HIV/AIDS

At Kimberley Hospital, over half the children who died were either HIV-infected or HIV-exposed.

Laboratory category	*2005 (% of all deaths)*
Negative	17.5
Exposed	13.3
Infected	38.6
Unknown	30.7
Total	100
Clinical HIV staging	*2005 (% of all deaths)*
Stage I	0.6
Stage II	1.8
Stage III	9.0
Stage IV	38.6
Not staged / Unknown	49.9
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*2005 (% of all deaths)*
NVP given	14.5
NVP not given	25.3
Mother negative	18.1
Unknown	42.2
Total	100

Inpatient mortality

The case fatality rates for various parameters are tabulated below.

	Admissions (no.)		*Deaths (no.)*		*Case fatality rate (%)*	
	2004	*2005*	*2004*	*2005*	*2004*	*2005*
All admissions	3967	3887	193	166	4.9	4.3
Age						
< 5 years	2400	2332	173	151	7.2	6.5
> 5 years	1567	1555	20	15	1.3	1.0
Under-5 admissions						
Nutritional status:						
< 3rd centile	1440	1)	106	110	7.4	1)
Severe malnutrition	101	1)	29	1)	28.7	1)
Illness:						
ARI	422	1)	46	1)	10.9	1)
DD	259	1)	22	1)	8.5	1)

1) No data

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
Septicaemia, possible serious bacterial infection	29
Pneumonia, ARI	25
PCP (suspected)	10
Acute diarrhoea, hypovolaemic shock	8
TBM/Other serious bact inf/Other circulatory system	3

All diagnoses: top 5	*2005 (% of all deaths)*
Pneumonia, ARI	24
Septicaemia, possible serious bacterial infection	21
Acute diarrhoea, hypovolaemic shock	9
PCP (suspected)	7
PTB	6

Information about quality of child healthcare

Records	*2005 (% all deaths)*
Folder not available	3.6
Folder available: incomplete and/or inadequate	25.9
Folder available: OK	70.0
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*2005 (% of MFs)*
Home*	39.6
Primary health clinic	24.5
Admission & Emergency care	12.7
Ward	19.5
Other	3.7
Total	100
Modifiable factors: who?	*2005 (% of MFs)*
Caregiver and family*	40.6
Administrator	12.4
Clinical personnel	47.1
Total	100

* The author did not originally include modifiable factors relating to the home and family

Discussion

About children who died

Malnutrition and AIDS constitute the major problems identified.

About quality of child healthcare

Many children with pneumonia and sepsis presented late.

At clinic level, failure to investigate for failure to thrive was the most common modifiable factor. The PMTCT programme was not running optimally and TB contacts were not identified.

Hypoglycaemia and inappropriate antibiotic usage were the biggest problems at the ward level.

Solutions

- Improve nutrition of mothers and children.
- Promote breastfeeding.
- Improve PMTCT programme and prevent paediatric AIDS.
- Improve IMCI training, including improved supervision at clinics post-training as well as introducing the IMCI community component.
- Implement case management courses for all primary care health workers.
- Publish Child PIP findings in local newspaper to encourage community involvement.
- Improve literacy of mothers.

Conclusion

Major political commitment and intervention is necessary to reach the millennium goal of significant reductions in childhood mortality.

The main thrust of the attack should be against malnutrition, the prevention of paediatric AIDS and socio-economic improvement of the poor.

Eastern Cape

Dora Nginza Hospital

Introduction

Dora Nginza Hospital (DNH) serves as a regional referral centre for paediatrics for the entire Cacadu District and the Nelson Mandela Municipality, which has a combined population of about 1.7 million comprising mainly of rural, peri-urban as well as urban communities.

DNH consists of two general paediatric medical wards, one paediatric surgical ward, a six-bed paediatric intensive care unit, a six-bed neonatal intensive care unit, a premature baby nursery and a term baby nursery. In addition it has a busy general and specialist paediatric outpatients department.

Six full time consultants, fourteen medical officers and eleven interns staff the hospital.

Methods

A retrospective study of inpatient folders was done on patients admitted from 1 September 2005 to 30 November 2005 at DNH. Only deaths that occurred because of medical problems were included in the study. Neonatal deaths and deaths due to surgical problems were excluded.

Charts were collected from the mortuary on a weekly basis, examined and the data entered onto the Child PIP forms. The data were analysed manually and not entered onto the Child PIP software, as no computer was available.

A significant obstacle to data collection was missing charts, hence some deaths that occurred in the ward were not summarised as the charts were missing from the mortuary.

No regular audit meetings took place as Child PIP was still in the introductory phase.

Results

Baseline data

A total of 1 074 medical patients was admitted in the three-month period from September to November 2005. There were 68 deaths giving a case fatality rate of 6.3%.

Dora Nginza Hospital	*September - November 2005*
Total admissions	1074
Total deaths	68
Case fatality rate (%)	6.3
Total modifiable factors	102
Modifiable factor rate (per death)	1.5

Information about children who died

Demographics

Age	*Sept - Nov 2005 (% of all deaths)*
< 1 year	60.3
1-2 years	13.2
2-5 years	8.8
5-13 years	10.3
Unknown	7.3
Total	100

Social context

Primary caregiver	*Sept - Nov 2005 (% of all deaths)*
Mother	70.6
Grandmother	1.4
Father	4.4
Other/Unknown	23.4
Total	100
Mother's wellbeing	***Sept - Nov 2005 (% of all deaths)***
Alive and well	66.2
Dead	4.4
Sick	7.3
Unknown	22.0
Total	100

Health context

NUTRITION

Weight	*Sept - Nov 2005 (% of all deaths)*
Normal	32.4
UWFA	21.1
Severe malnutrition	35.2
Unknown	11.3
Total	100

HIV/AIDS

At Dora Nginza Hospital, 59% of the children who died were either HIV-infected or HIV-exposed.

Laboratory category	*Sept - Nov 2005 (% of all deaths)*
Negative	5.9
Exposed	47.0
Infected	11.8
Unknown	35.2
Total	100
Clinical HIV staging	*Sept - Nov 2005 (% of all deaths)*
Stage I	0
Stage II	0
Stage III	2.8
Stage IV	1.4
Not staged/Unknown	95.8
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*Sept - Nov 2005 (% of all deaths)*
NVP given	1.4
NVP not given	2.9
Mother negative	0
Unknown	95.6
Total	100

Inpatient mortality

The overall case fatality rate for September to November 2005 was 6.3%, but CFRs for specific parameters could not be calculated.

Causes of child deaths

Main diagnosis	*Sept – Nov 2005 (% of all deaths)*
Pneumonia, ARI	47.1
Septicaemia, possible serious bacterial information	8.8
Acute diarrhoea, hypovolaemic shock	5.9
Meningitis: bacterial	4.4
TB: Pulmonary	2.9

Information about quality of child healthcare

Records	*Sept - Nov 2005 (% of all deaths)*
Folder available: incomplete and/or inadequate	89.7
Folder available: OK	10.3
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*Sept - Nov 2005 (% of MFs)*
Home	43.1
Primary health clinic	0
Admission & Emergency care	9.8
Ward	47.1
Total	100
Modifiable factors: who?	***Sept - Nov 2005 (% of MFs)***
Caregiver and family	43.1
Administrator	10.8
Clinical personnel	46.1
Total	100

Discussion

About children who died

Seventy-three percent of all deaths were in children under the age of two years.

HEALTH CONTEXT

Over one-third of all deaths occurred in severely malnourished children.

Forty-seven percent of deaths occurred in HIV-exposed children, however there were no details as to whether these patients were on the PMTCT programme or not. The PMTCT programme was not fully functional as a large proportion of women refused voluntary antenatal HIV testing.

CAUSES OF DEATH

Pneumonia accounted for 47% of all deaths.

About quality of child healthcare

The most common individual modifiable factor encountered at DNH was inappropriate nutrition, although the ward and clinical personnel categories comprised the largest number of modifiable factors as a whole.

IMCI was not widely practiced at primary healthcare facilities in the Eastern Cape.

A large proportion of patients were brought to hospital after hours and over weekends, and the vast majority had not visited a primary healthcare facility. Patient access to primary healthcare was limited, with after-hours care only being available at one hospital, namely DNH. Two other paediatric departments that had previously provided secondary level care had been closed down. As a result, DNH has

been unable to cope with the load from a facility point of view and staffing has been a major problem.

The paediatric wards were filled to capacity. This factor, combined with the shortage of staff, resulted in insufficient monitoring and premature discharge of patients. At night and over weekends the professional nurse to patient ratio was usually 1:40.

Storage of records was problematic. Patients were admitted with a new folder for every admission and valuable information was lost.

Solutions

- Train primary healthcare workers in IMCI.
- Improve patient access to primary healthcare, especially after hours.
- Improve the PMTCT programme to ensure a higher rate of testing.
- Provide additional level two paediatric care.
- Employ more professional nurses within the hospital setting.
- Install a centralised filing system.

Conclusion

Although the Child PIP programme is still in its infancy at Dora Nginza Hospital, it has assisted in identifying patients at risk, as well as highlighting areas that require improvement. These include greater involvement of the medical and nursing staff, improved record keeping, better history taking and staging of HIV-positive patients.

The acquisition of a computer early in 2006 will allow the audit process to be extended by entering the data into the Child PIP software for analysis. The expansion of Child PIP within DNH will provide opportunities to improve hospital care, as well as to include the primary healthcare facilities and the community in addressing modifiable factors.

Western Cape

Eben Dönges Hospital

Introduction

Eben Dönges Hospital (EDH) is a 350-bed hospital situated in Worcester, approximately 110km from Cape Town, in the Boland/Overberg region of the Western Cape. It provides mainly secondary level care with some primary and tertiary services.

It is a rural hospital, serving rural to remotely rural populations in a large demographic area. The vast majority of patients is from low to very low-income groups who live in informal housing. Most do not have running water, electricity or flush toilets. The main spoken language is Afrikaans, with fast growing English- and Xhosa-speaking populations. The majority of employed people are in the informal or part-time sector (many farm or seasonal labourers) and there is a 43% unemployment rate in Worcester. There are also high levels of alcohol abuse.

Seven district hospitals and over eighty-seven clinics (including many mobile clinics) refer patients to EDH. Referrals from Worcester are received from the Community Health Centre, general practitioners and various clinics in the informal settlements, the biggest being Sandhills and Empilisweni Clinics.

There are 67 paediatric beds at Eben Dönges Hospital in a 30-bed general paediatric ward, a 16-bed neonatal unit, a single high care bed, a 6-bed KMC unit and a 15-bed gastroenteritis room, as well as ten unofficial beds in casualty. The daily inpatient load consists of 70-85 patients in the available beds. The general ward is shared with ENT, surgery and sometimes orthopaedics, thus the facilities are often overloaded. There is one ventilator for children (the hospital has two in total) but as it is shared with all the other departments, children are often ventilated with cylinders in the ward, casualty or the nursery.

Two full-time paediatricians and four part-time paediatricians who help with after-hours duties as well as two clinics per week staff the hospital. There is also one registrar, one full-time medical officer and two to three community service doctors or interns (three-month rotation).

With more than 180 ventilations per year, it is almost impossible to run the department with this level of staffing.

Methods

Data were collected manually from January to December 2005. The total hospital admissions were obtained from the hospital data on a patient surname basis, thus a patient admitted twice in one month would only be recorded once. The senior paediatrician completed the Child PIP forms, sometimes in retrospect, and unfortunately, not all data were always available. The hospital has no official computerised programme for patient data collection. Audit meetings were held once every three months at which all deaths and re-admissions were discussed in detail. All deaths (both medical and from other disciplines) were discussed and the meetings were well attended.

Results

Baseline data

Eben Dönges Hospital	*2005*
Total admissions	3489
Total deaths	18
Case fatality rate (%)	0.5
Total modifiable factors	30
Modifiable factor rate (per death)	1.7

Information about children who died

Demographics

Age	*2005 (% of all deaths)*
< 1 year	66.7
1-5 years	27.8
5-13 years	5.6
Total	100

Social context

Primary caregiver	*2005 (% of all deaths)*
Mother	94.4
Other	5.6
Total	100
Mother's wellbeing	***2005 (% of all deaths)***
Alive and well	94.4
Unknown	5.6
Total	100

Health context

NUTRITION

Weight	*2005 (% of all deaths)*
Overweight	5.9
Normal	52.9
UWFA	35.3
Severe malnutrition	11.8
Total	100

HIV/AIDS

At Eben Dönges Hospital, 44% of the children who died were HIV-infected.

Laboratory category	*2005 (% of all deaths)*
Negative	11.2
Exposed	0
Infected	44.4
Unknown	44.4
Total	100
Clinical HIV staging	*2005 (% of all deaths)*
Stage I	0
Stage II	18.8
Stage III	18.8
Stage IV	0
Not staged / Unknown	62.5
Total	100

PMTCT

Nevirapine (NVP) prophylaxis	*2005 (% of all deaths)*
NVP given	0
NVP not given	5.6
Mother negative	5.6
Unknown	88.9
Total	100

Inpatient mortality

The case fatality rates for various parameters are tabulated below.

	Admissions (no.)	*Deaths (no.)*	*Case fatality rate (%)*
All admissions	3489	18	0.5
< 1 year	1658	12	0.7
1-5 years	1339	5	0.4
5-13 years	492	1	0.2

Causes of child deaths

Main diagnosis	*2005 (% of all deaths)*
Acute diarrhoea, hypovolaemic shock	28
AIDS	17
Pneumonia, ARI	17
Septicaemia, possible serious bacterial infection	11
PCP (suspected)/Miliary TB/Birth defects/Surgical/RHD	6

Information about quality of child healthcare

Records	*2005 (% all deaths)*
Folder not available	4.5
Folder available: incomplete and/or inadequate	18.2
Folder available: OK	77.3
Total	100

The following tables show the occurrence of modifiable factors in terms of the place where they occur and the people responsible.

Modifiable factors: where?	*2005 (% of MFs)*
Home	50.0
Primary health clinic	17.9
Admission & Emergency care	7.1
Ward	25.0
Total	100
Modifiable factors: who?	*2005 (% of MFs)*
Caregiver and family	44.0
Administrator	8.0
Clinical personnel	48.0
Total	100

Discussion

About children who died

Surgical patients, not referred timeously to tertiary hospitals for surgery, accounted for 30% of deaths. This problem has been addressed since the start of Child PIP.

Some patients (three) were accepted from the PHC centres for end-of-life decisions and terminal care.

SOCIAL CONTEXT

Poverty, unemployment, low levels of educated parents and substance abuse constituted the main social problems.

HEALTH CONTEXT

HIV testing and the PMTCT programme have not yet been effectively rolled out.

The ART enrolment programme at Eben Dönges has more than 60% of all known HIV-positive children on treatment.

INPATIENT MORTALITY

Mortality is extremely low in the hospital as vigorous and intense ward rounds were conducted every day. Medical paediatric patients were referred timeously to the tertiary unit, and terminal patients to a hospice. The senior paediatrician attended every resuscitation and intubation to oversee care of critically ill patients.

CAUSES OF DEATH

The biggest problems were chronic lung disease and PTB, as well as severe DD with malnutrition.

About quality of child healthcare

The most common modifiable factors were: Caregiver delay in seeking care; inappropriate nutrition; and problems with inter-hospital referrals and transport.

Delay in seeking care was often secondary to infrequent or very expensive transport and the long working hours of caregivers.

At clinics the diagnosis, treatment and contact tracing of tuberculosis was poor.

Staff shortages in the hospital were severe. There was high staff turnover and only young doctors, generalists and interns were available after-hours.

The difficulties transferring critically ill patients to tertiary units, as well as transfers from rural units into EDH were due to lack of tertiary resources and poor ambulance services.

Solutions

- Increase staffing to match the patient load.
- Provide better equipment for clinics.
- Train all staff.
- Urgently review the ambulance system.

Conclusion

The relative non-availability of tertiary ventilation beds remains a massive problem, along with the enormous work load and stress associated with a very small-staffed department. Hopefully, Child PIP will continue to provide data in support of the identified problems and significant change will occur to bring about improved care for children in the area.

List of Abbreviations and Definitions

Definitions

A&E	Admission and Emergency
ARI	Acute Respiratory Infection
ART	Anti-Retroviral Treatment
Case fatality rate (CFR)	Number of deaths in a specific age group during a specific time period divided by number of admissions in the same age group and time period. Can be calculated also for specific disease categories.
Case management	Drug treatment and non-drug treatment, intravenous fluids, feeding, communication with the caregiver and follow-up
CEMD	Confidential Enquiry into Maternal Deaths (could be regarded as maternal component of PPIP and ChIP)
CHC	Community Health Centre
Child PIP or ChIP	Child Healthcare Problem Identification Programme
Clinic nurse	Nurse employed by the district, working in a peripheral clinic
Clinical personnel	Nurses and doctors
CSD	Community Service Doctor
DOA	Dead On Arrival
DOH	Department of Health
EDL	Essential Drug List
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HSRC	Human Sciences Research Council
IMCI	Integrated Management of Childhood Illness (a WHO training and implementation programme for paediatric primary care)
IV fluids	Intravenous fluids

Healthworker	Doctors, nurses, paramedical health workers
(P)ICU	(Paediatric) Intensive Care Unit
IMR	Infant Mortality Rate
INP	Integrated Nutrition Programme
KMC	Kangaroo Mother Care
MCWH	Maternal, Child and Women's Health
Modifiable Factors	Events, actions, omissions contributing to the death of a child or to substandard care, in a child who died
Mortality Review Meetings	Regular audit meetings with all health workers involved, to discuss paediatric deaths that have occurred in health institutions
MRC	Medical Research Council
NGO	Non-Governmental Organization
OPD	Out Patient Department
OWFA	Overweight For Age
PCP	Pneumocystis carinii or Pneumocystis jirovecii pneumonia
PCR	Polymerase Chain Reaction blood test
PHC	Primary Healthcare
PMTCT	Prevention of Mother To Child Transmission of HIV
QI	Quality Improvement
PPIP	Perinatal Problem Identification Programme
RuDASA	Rural Doctors Association of Southern Africa
RTHC (Road-to-Health Chart)	Under-5 chart, patient-retained record of the child's weights, immunizations and health problems
SAPA	South African Paediatric Association
Severe malnutrition	Marasmus, kwashiorkor or marasmic kwashiorkor
U5PIP	Under-5 Problem Identification Programme
UWFA	Underweight For Age (below the 3rd centile for weight for age, according to the Wellcome classification)
VCT	Voluntary Counselling and Testing (for HIV)
WHO	World Health Organisation

Appendices

Appendix A: Data tables for Chapter 1

Appendix B: Child PIP Data Capture Sheets

- Monthly Tally
- Deaths Register
- Death Data Capture Sheet

Appendix C: HIV Staging

Appendix D: Child PIP Code Lists

- Cause of Death
- Modifiable Factors

Appendix E: Additional Tools

- Paediatric Ward Admissions and Discharge Register
- Clerking Admission Sheet
- Child PIP Mortality Review Process Guideline

Appendix A: Data Tables for Chapter 1

Table A1: Admissions, Deaths, Case Fatality Rate, and Modifiable Factors per Site

		Metsimaholo		*National District*	*Coronation*	*Kalafong*		*Christ the King*	*Edendale*		*Grey's*		*Mahatma Ghandi*	*Witbank*		*Kimberley*		*Mafikeng*		**Total**
		2004	2005	2005	2005	2004	2005	2005	2004	2005	2004	2005	2005	2004	2005	2004	2005	2004	2005	2005
Admissions		841	1014	797	1942	3927	1222	1467	2811	1498	677	1079	2302	1948	1016	2400	3251	4389	5303	20 891
Deaths		50	61	25	81	134	120	119	415	137	79	107	190	125	64	173	132	356	382	1 416
CFR 0-18			6.0	3.1	4.2		9.8	8.1		9.1		9.9	8.3		6.3		4.1		7.2	6.8
CFR 0-5 yrs		5.9	6.5	3.2	4.5	3.4	11.8	9.9	15	8.9	12	10.9	9.7	6.4	6.6	7.2	5.3	8.1	8.3	
Modifiable Factors		375	174	49	192	92	202	282		298	214	273	291	70	-	205	323	1328	1525	3 610
MF per death		7.5	2.8	2.0	2.4	0.7	1.7	2.4		2.2	2.7	2.6	1.5	0.5	-	1.2	2.4	3.7	4	2.3
Home			7	82	51		15	41		28		21	29		-		40		8	22
Administrators			7	4	10		26	16		9		12	41		-		12		30	22
Clinical personnel	PHC		1	4	14		15	5		8		13	19		-		25		18	15
	A&E		54	6	6		14	10		17		21	34		-		13		37	27
	Ward		33	8	21		20	16		27		26	16		-		20		31	26

Notes:
Data in the above table reflects the amalgamated data used in the software programme for analysis in Chapter 1.
It may differ in some cases from the data used in the individual site reports due to initial software problems experienced at some of the sites.

2004 data: 0-5 years only; 2005 data: 0-18 years

Hospitals that started Child PIP in January 2005 have no 2004 data available

Data from Coronation and Edendale Hospitals for 5-6 months only (started Child PIP during 2005)

Modifiable factors are expressed as a proportion (%) of all modifiable factors

Table A2: Age and Gender of deaths

Age	*Number*	*% of all deaths*
0-1 month	240	15.6
1 month-1 year	622	40.3
1-5 years	493	32
5-13 years	8	0.5
13-18 years	172	11
Unknown	8	0.51
Total	1543	100
Gender	*Number*	*% of all deaths*
Female	706	51.9
Male	801	45.8
Unknown	36	2.3
Total	1543	100

Table A3: Referral patterns of deaths

Referred from	*Number*	*% of all deaths*
Another hospital	247	27
Clinic	405	44.2
Private	113	12.3
No Data	149	16.3
Unknown	2	0.2
Total	916	100
Referral location	*Number*	*% of all deaths*
Inside drainage area	604	71.9
Outside drainage area	78	9.3
No Data	148	17.6
Unknown	10	1.2
Total	840	100

Table A4: Length of Stay of deaths

Length of stay	*Number*	*% of all deaths*
< 24 hours	483	31.3
1-3 days	394	25.5
4-7 days	270	17.5
8-14 days	187	12.1
> 14 days	209	13.5
Total	1543	100

Table A5: Social context: caregiver data for deaths

Primary caregiver	*Number*	*% of all deaths*
Mother	895	58
Grandmother	195	12.6
Father	6	0.4
Other	127	8.2
No Data	199	12.9
Unknown	121	7.8
Total	1543	100
Mother's wellbeing	***Number***	***% of all deaths***
Alive and Well	872	56.5
Dead	101	6.5
Sick	143	9.3
No Data	167	10.8
Unknown	260	16.9
Total	1543	100
Father's wellbeing	***Number***	***% of all deaths***
Alive and Well	297	19.2
Dead	54	3.5
Sick	34	2.2
No Data	106	6.9
Unknown	1052	68.2
Total	1543	100

Table A6: Nutritional status of deaths

Nutritional category	*Number*	*% of all deaths*
OWFA	15	1
Normal	330	21.4
UWFA	424	27.5
Kwashiorkor	383	24.8
Marasmus	61	4
Marasmic Kwashiorkor	69	4.5
No Data	189	12.2
Unknown	72	4.7
Total	1543	100

Table A7: HIV laboratory status and nutritional classification of under-5 deaths

Nutrition / *Laboratory*	OWFA	Normal	UWFA	Marasmus	Kwash	M - K	Unknown	**Total**
Negative	1	37	39	10	9	5	4	105
Exposed	5	86	114	80	7	7	5	304
Infected	3	37	91	144	10	21	6	312
Not tested (but indicated)	4	56	56	45	12	13	8	194
Not tested (not indicated)	0	5	6	1	1	0	5	18
Unknown / No result	1	74	76	45	18	20	188	422
Total	14	295	382	325	57	66	216	1355

Table A8: HIV Status of deaths

Laboratory category	*Number*	*% of all deaths*
Negative	125	8.1
Exposed	305	19.8
Infected	402	26.1
Not tested (but indicated)	211	13.7
Not tested (not indicated)	19	1.2
Unknown / No result	481	31.1
Total	1543	100
Clinical HIV staging	*Number*	*% of all deaths*
Stage I	40	2.6
Stage II	83	5.4
Stage III	307	19.9
Stage IV	458	29.7
Not staged	339	22
Unknown	316	20.5
Total	1543	100

Table A9: HIV laboratory status in different age groups

Age / *Laboratory*	0-1 month	1month -1 year	1-5 years	5-13 years	13-18 Years	Unknown	**Total**
Negative	11	56	38	18	2	0	125
Exposed	78	175	51	1	0	0	305
Infected	8	153	151	85	4	1	402
Not tested (but indicated)	33	92	69	16	1	0	211
Not tested (not indicated)	0	10	8	1	0	0	19
Unknown / No result	110	136	176	51	1	7	481
Total	240	622	493	172	8	8	1543

Table A10: HIV Laboratory category and Staging for those deaths where testing was done

Stage / *Lab*	Stage I	Stage II	Stage III	Stage IV	Staged	Not staged	Unknown	**Total**
Negative	5	1	5	3	(14)	104	7	125
Exposed	12	22	70	117	(221)	69	15	305
Infected	0	17	113	234	(364)	31	7	402
Total	17	40	188	354	(599)	204	29	832

Table A11: PMTCT – Nevirapine prophylaxis

Nevirapine prophylaxis	*Number*	*% of all deaths*
Given	111	7.2
Not given	292	18.9
Mother negative	131	8.5
Unknown	1009	65.4
Total	1543	100

Table A12: Infant feeding practice in the first 6 months of life

Infant feeding	0-1 month	1 month-1 yr	1-5 yrs	**Total**	**%**
Exclusive breast	38	95	36	169	12.5
No breast, ever	36	114	32	182	13.4
Mixed	36	125	94	255	18.8
Unknown / No data	130	288	331	749	55.3
Total	240	622	493	1355	100

Table A13: PCP prophylaxis in all deaths (cotrimoxazole)

Cotrimoxazole prophylaxis	*Number*	*% of all deaths*
Current	217	14.1
Ever	28	1.8
Never (but indicated)	151	9.8
Never (not indicated)	84	5.4
Unknown / No data	1063	68.9
Total	1543	100

Table A14: Cotrimoxazole prophylaxis in PCP deaths (suspected or confirmed)

Cotrimoxazole prophylaxis	*Number*	*% of PCP deaths*
Current	39	19.4
Ever	5	2.5
Never (but indicated)	53	26.4
Never (not indicated)	0	0
Unknown	104	51.7
Total	201	100

Table A15: Anti-retroviral therapy (ART) in child deaths and their mothers

ART – child deaths	*Number*	*% of all deaths*
Current	44	2.9
Ever	9	0.6
Never (but indicated)	655	42.4
Never (not indicated)	115	7.5
Unknown / No data	720	46.7
Total	1543	100
ART - mothers	*Number*	*% of all deaths*
Current	13	0.8
Ever	1	0.1
Never (but indicated)	265	17.2
Never (not indicated)	80	5.2
Unknown / No data	1184	76.7
Total	1543	100

Table A16: Case fatality rates by age and nutritional status

Age group	*Admissions (no.)*	*Deaths (no.)*	*Case fatality rate (%)*
0-1 month	1205	69	5.7
1-12 months	7831	825	10.5
1-5 years	7369	371	5.0
5-13 years	4358	146	3.4
13-18 years	128	5	3.9
Total	20891	1416	6.8
Nutritional status	***Admissions (no.)***	***Deaths (no.)***	***Case fatality rate (%)***
>/= 3rd centile	4774	220	4.6
< 3rd centile	3263	483	14.8
Severe malnutrition	293	34	11.6
Unknown / No data	5370	481	9.0
Total	13700	1218	8.9

Table A17: Cause of death: main and other diagnosis (all diagnoses)

	Main	*Other*	*Total*	*Percent*
Pneumonia, ARI	313	185	498	18.0
Septicaemia, possible serious bacterial information	239	118	357	12.9
Acute diarrhoea, hypovolaemic shock	195	120	315	11.4
PCP (suspected or confirmed)	201	38	239	8.6
TB: pulmonary/extra-pulmonary	97	129	226	8.2
Chronic diarrhoea	75	76	151	5.5
Other Serious Infection (specify)	22	73	95	3.4
Meningitis: bacterial	67	20	87	3.1
Anaemia	2	83	85	3.1
Other Circulatory System (specify)	24	56	80	2.9
Other Diagnosis (specify)	41	8	49	1.8
AIDS	19	24	43	1.6
Ill-defined/unknown causes of mortality	37	2	39	1.4
Heart failure, Pulmonary Oedema	21	16	37	1.3
Other Endocrine, Nutritional, Metabolic (specify)	15	17	32	1.2
Hospital-acquired infection	9	22	31	1.1
Cirrhosis, Portal hypertension, Liver failure, Hepatitis	14	16	30	1.1
Hypoglycaemia	5	24	29	1
Other Respiratory failure (specify)	9	19	28	1
Missing	0	26	26	0.9
Inhalation of foreign body or gastric content	10	14	24	0.9
Acute renal failure	3	21	24	0.9
Leukaemias	15	7	22	0.8
Other Nervous System (specify)	7	14	21	0.8
Status epilepticus	9	12	21	0.8
Surgical (appendix, hernia, intestines, peritoneum)	11	6	17	0.6
Cardiomyopathy	7	9	16	0.6
Pneumothorax, Pyothorax, Pleural effusion	5	10	15	0.5
Other Oncology, Haematology (specify)	1	13	14	0.5
Other Digestive System (specify)	1	9	10	0.4
Meningitis: Viral (meningo-encephalitis)	5	4	9	0.3
Non-accidental injury, abuse-related, neglect	5	3	8	0.3
Croup	4	4	8	0.3
Dysentery	3	4	7	0.3
Burns	6	1	7	0.3
Other Poisonings (specify)	3	4	7	0.3
RHD, Rheumatic fever	4	1	5	0.2
Congenital malformations of the respiratory system	2	3	5	0.2
Myocarditis	3	2	5	0.2
Congenital Infections (not HIV)	2	2	4	0.1
Other Inflammatory Disease of CNS (e.g. abscess)	1	3	4	0.1
Other Genito-urinary System (specify)	1	2	3	0.1
Chronic renal disease	3	0	3	0.1
Congenital Heart Disease	2	0	2	0.1
Other Accidents (including drowning; specify)	2	0	2	0.1
Malaria	1	0	1	0
Bites and Stings, Toxic Plants	1	0	1	0
Acute nephritic	1	0	1	0
Paraffin	1	0	1	0
Transport related accidents	0	1	1	0
Unknown	1	0	1	0
Total	1543	1221	2764	100

Table A18: Underlying conditions for all deaths

Underlying condition	*Number*	*% of all deaths*
None	686	44.5
Missing	566	36.7
Other (specify)	198	12.8
Ex-low birth weight / Prematurity	48	3.1
Birth defect	22	1.4
Cerebral palsy	10	0.6
Twin / multiple pregnancy	8	0.5
Hydrocephalus	5	0.3
Total	1543	100

Table A19: Modifiable factors in Home and Community

Caregiver	*Number*	*% of MFs*
Declining HIV test	59	7.6
Did not arrive on day of referral / did not keep appointment	23	3.0
Never immunised/ behind with immunisations	34	4.4
Insufficient information / notes on caregiver / family care	0	0
Inappropriate nutrition	105	13.5
Other modifiable factor concerning caregiver / family (specify)	35	4.5
Caregiver did not realize severity of illness	122	15.7
Caregiver refusing treatment	6	0.8
Home treatment with negative effect on the child, eg. Enema	53	6.8
RTHC not present / referral letter lost	58	7.5
Delay in seeking care	229	29.5
Infrequent clinic attendance	51	6.6
Total	775	100

Table A20: Modifiable factors at Primary Healthcare Level

Clinical Personnel	*Number*	*% of MFs*
Delay in referring	124	23.1
Case Assessment	144	26.9
Insufficient Monitoring	20	3.7
Case Management	111	20.7
Other	21	3.9
Total - Clinical Personnel	420	78.4
Administrators		
Access / Barriers	40	7.5
Communication	8	1.5
Lack of Drugs, IV fluids	34	6.3
Lack of Equipment	6	1.1
Laboratory	5	0.9
Personnel	4	0.7
Policy	0	0
Transport	19	3.5
Other	0	0
Total - Administrators	116	21.6
Total	536	100

Table A21: Modifiable factors at Admission & Emergency

Clinical Personnel	*Number*	*% of MFs*
Case Assessment	273	27.8
Insufficient Monitoring	116	11.8
Case Management	219	22.3
Total - Clinical Personnel	608	62.0
Administrators		
Access	165	16.8
Communication	38	3.9
Lack of Drugs, IV fluids	9	0.9
Lack of Equipment	34	3.5
Laboratory	12	1.2
Lack of Personnel	97	9.9
Lack of Policy	4	0.4
Lack of Transport	14	1.4
Total - Administrators	373	38.0
Total	981	100

Table A22: Modifiable factors in Ward

Clinical Personnel	***Number***	***% of MFs***
Delay in referring	25	2.7
Delay in calling senior opinion	26	2.8
Feeding	46	5.0
Case Assessment	156	17.0
Insufficient Monitoring	167	18.2
Case Management	136	14.8
IV Fluids & Intake/Output	138	15.0
Total - Clinical Personnel	694	75.5
Administrators		
Access	24	2.6
Communication	26	2.8
Lack of Drugs, IV fluids	8	0.9
Lack of Equipment	21	2.3
Laboratory	3	0.3
Lack of Personnel	136	14.8
Lack of Policy	4	0.4
Lack of Transport	3	0.3
Total – Administrators	225	24.5
Total	919	100

Table A23: Avoidable deaths

'Was this death avoidable?'	***Number***	***% of all deaths***
Yes	146	9.5
Not sure	68	4.4
No	39	2.5
Unknown	69	4.5
No data	1186	76.9
Total	1543	100

Appendix B: Child PIP Data Capture Sheets

- Monthly Tally
- Deaths Register
- Death Data Capture Sheet

Child Healthcare Problem Identification Programme

Monthly Tally Sheet

ChIP v2.0

Hospital: _____ Year: _____

Ward: _____ Month: _____

		Admissions[1]	Deaths[2]	Case fatality rates[4,5]
Age	0 - < 1 month			
	≥ 1 month - < 1 yr			
	≥ 1 yr - < 5 yrs			
	≥ 5 yrs - < 13 yrs			
	≥ 13 yrs - 18 yrs			
	Unknown			
	Totals			

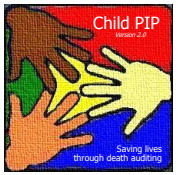
Complete information below for children <u>< 5 years only</u>				
Weight	Above or on 3rd centile			
	UWFA			
	Severe malnutrition[3]			
	Unknown			
	Totals			
Illness	Acute lower respiratory infections			
	Diarrhoeal disease			
	Other			
	Totals			

Notes:

1. Include **<u>all</u>** children admitted to your institution's paediatric/paediatric surgical/children's service
2. Include all "deaths-on-arrival" (applies mainly to POPD/Casualty)
3. Severe malnutrition includes Marasmus, Marasmic-Kwashiorkor and Kwashiorkor
4. Case fatality rates should be calculated for each group and each month (the computer does this automatically)
5. The formula is: CFR = $\frac{\text{deaths}}{\text{admissions}} \times 100$

Compiled by: _____(Print name) _____(Sign)

Date: _____ Fax / Tel number: _____



Child Healthcare Problem Identification Programme

Monthly Deaths Register

ChIP v2.0

Hospital: _____ Year: _____

Ward: _____ Month: _____

Deaths Register No.	Surname Name	Folder number	Age	Date of Admission	Date of Death	Weight (N/UWFA/Severe malnutrition)	Discharge (death) Diagnosis	Folder in ChIP box?	ChIP form completed?	Entered on PC?

Hospital: _____ Child Healthcare Problem Identification Programme Ward: _____

Child Death Data Capture Sheet

ChIP v2.0

Deaths Register Number: _____ Entered on computer: _____

Patient name:			Folder no:		Nearest town/district:	
DoB	yyyy-mm-dd	**Age** pc calculates	**Gender**	Ⓜ / Ⓕ	**Re-admission**	Ⓨ / Ⓝ / Ⓤ
Dead on arrival	Ⓨ / Ⓝ / Ⓤ					
When death occurred	Weekday (07:00-19:00)	Weeknight (19:00-07:00)	Weekend/ Public holiday			
Date of Admission	yyyy-mm-dd	**Time** __:__	**Date of Death**	yyyy-mm-dd	**Time**	__:__

Records

1. Folder not available	2. Folder present, records incomplete e.g. no RTHC	3. Folder present, notes inadequate (quality of notes is poor)	4. Folder present, records incomplete AND notes inadequate	5. Folder available, records & notes OK

Referred

	Name of hospital/clinic:				
Ⓨ / Ⓝ / Ⓤ	**If yes, from:**	1. Another hospital	2. A clinic	3. Private sector	Unknown
	If yes, from:	1. Inside drainage area	2. Outside drainage area	Unknown	

Social

Mother	1. Alive and well	2. Dead	3. Sick	Unknown	**Primary caregiver**	1. Mother	2. Grandmother
Father	1. Alive and well	2. Dead	3. Sick	Unknown		3. Father	4. Other: _____

Nutrition (tick one category box, then fill in actual weight: enter "999" if weight unknown)

1. OWFA	2. Normal	3. UWFA	4. Marasmus	5. Kwashiorkor	6. M-K	Unknown	**Weight** _____kg

HIV / AIDS (enter status at time of admission, not at time of audit: this is NOT a post-mortem assessment)

Lab	1. Negative	2. Exposed	3. Infected	4. No result	5. Not tested (but indicated)	6. Not tested (not indicated)	Unknown
Clinical	1. Stage I	2. Stage II	3. Stage III	4. Stage IV	5. Not staged (but indicated)	6. Not staged (not indicated)	Unknown

PMTCT	1. Prophylaxis given	2. Prophylaxis not given	3. Mother negative at delivery	Unknown
Feeding in first 6 months	1. Exclusive breast for 6/12	2. No breast, ever	3. Mixed, from birth	Unknown

Cotrimoxazole	1. Current	2. Ever	3. Never (but indicated)	4. Never (not indicated)	Unknown
ARV (child)	1. Current	2. Ever	3. Never (but indicated)	4. Never (not indicated)	Unknown
ARV (mother)	1. Current	2. Ever	3. Never (but indicated)	4. Never (not indicated)	Unknown

Cause of Death (insert codes)

Main cause of death:		**Underlying condition:**	
Other important diagnoses (max 4):			

Modifiable Factors (insert codes)

Code	**Family/Caregiver**		Comments	Code	**Clinic/Ambulatory**		Comments
	Probable	Possible/ ?			Probable	Possible/ ?	
	Probable	Possible/ ?			Probable	Possible/ ?	
	Probable	Possible/ ?			Probable	Possible/ ?	
	Probable	Possible/ ?			Probable	Possible/ ?	
Admissions & Emergency: Hospital				**Ward: Hospital**			
	Probable	Possible/ ?			Probable	Possible/ ?	
	Probable	Possible/ ?			Probable	Possible/ ?	
	Probable	Possible/ ?			Probable	Possible/ ?	
	Probable	Possible/ ?			Probable	Possible/ ?	
	Probable	Possible/ ?			Probable	Possible/ ?	

In your opinion, had the process of caring been different, would this death have been avoidable?

Yes	Not sure	No	Unknown

Case Summary/Comments (write summary at time of death, if possible)

Appendix C: HIV Staging

Notes for Completing HIV/AIDS Section on the DCS

ChIP v2.0

When completing the HIV/AIDS section, use the HIV/AIDS status at the time of admission (NOT at the time of the audit) as it is the status while alive that determines clinical decision making, and quality of care

Laboratory

Negative

- Child tested antibody or antigen negative, with either a rapid, ELISA, p24 or PCR test (however, p24 sensitivity is only 30% so there are many false negatives)

Exposed

- Mother tested antibody positive (preferably with ELISA confirmation) in pregnancy, or later
- A child under 18 months of age with a positive antibody test (rapid, preferably with ELISA confirmation)

Infected

- A child over 18 months of age with positive antibody test (rapid, preferably with ELISA confirmation)
- Antigen positive at any age (PCR not usually recommended until at least 6 weeks, as it may take time for the viral load to reach PCR detectable levels)

No result

- Test requested but no result available or result equivocal

Not tested

- Not tested, due to error or omission (i.e. but indicated), or
- Not tested, as it was not indicated (i.e. not indicated)

Unknown

- Insufficient information available to make one of the above choices

Clinical Stage

The current staging is overleaf – this is a modification of the original WHO Clinical Staging Guidelines, done by the South African National Paediatric HIV Consensus Team. Updates may be made from time to time.

Use this staging sheet to stage children WHILE THEY ARE STILL ALIVE

Stage I, Stage II, Stage III, Stage IV

- Tick each feature as it occurs/is found
- The stage is the most advanced in which the child has one or more conditions described

Not staged

- HIV suspected but staging not done (i.e. but indicated), or
- HIV not suspected (i.e not indicated)

Unknown

- Insufficient information to make one of the above choices

PMTCT

Prophylaxis includes Nevirapine or any other ARVs used for prevention of vertical transmission.
'Prophylaxis not given'' refers to those cases where it was indicated but not received. Select 'Mother negative at delivery' or 'Unknown' for any others who did not receive PMTCT.

Feeding

This is self-explanatory. If the child is older, the information is still relevant, as the child may now be dead because of mixed feeding. If the mother/caregiver cannot remember or does not know, select 'Unknown'.

Cotrimoxazole prophylaxis

Record the child's experience of cotrimoxazole prophylaxis, but exclude therapeutic cotrimoxazole.

ARV (child/mother)

'ARV' refers to exposure to any antiretroviral therapy, apart from PMTCT, used currently or any time prior to presentation. This information needs to be gathered both for the child and the mother.

INTERIM REVISED WHO CLINICAL STAGING OF HIV/AIDS

Stage I

- Asymptomatic
- Persistent generalized lymphadenopathy

Stage II

- Hepatosplenomegaly
- Papular pruritic eruptions
- Seborrhoeic dermatitis
- Extensive human papilloma virus infection
- Extensive molluscum contagiosum
- Fungal nail infections
- Recurrent oral ulcerations
- Lineal gingival erythema (LGE)
- Angular chelitis
- Parotid enlargement
- Herpes zoster
- Recurrent or chronic RTIs (otitis media, otorrhoea, sinusitis)

Stage III

- Moderate unexplained malnutrition not adequately responding to standard therapy
- Unexplained persistent diarrhoea (14 days or more)
- Unexplained persistent fever (intermittent or constant, for longer than 1 month)
- Oral candidiasis (outside neonatal period)
- Oral hairy leukoplakia
- Acute necrotizing ulcerative gingivitis / periodontitis
- Pulmonary TB
- Tuberculous lymphadenopathy (axillary, cervical or inguinal)
- Severe recurrent presumed bacterial pneumonia
- Unexplained anaemia (< 8 g/dl), &/or neutropenia (< 0.5 x 10^9/l) &/or thrombocytopenia (< 50 x 10^9/l) for > 1 month
- Chronic HIV-associated lung disease including bronchiectasis
- Symptomatic lymphoid interstitial pneumonitis (LIP)

Stage IV

- Unexplained severe wasting or severe malnutrition not adequately responding to standard therapy
- Pneumocystis pneumonia
- Recurrent severe presumed bacterial infection (eg empyema, pyomyositis, bone/joint infection, meningitis, but excluding pneumonia)
- Chronic herpes simplex infection (orolabial or cutaneous of more than 1 month's duration, or visceral at any site)
- Extrapulmonary TB
- Kaposi's sarcoma
- Oesophageal candidiasis, or *Candida* of trachea, bronchi or lungs
- CNS toxoplasmosis (outside the neonatal period)
- HIV encephalopathy
- CMV infection (CMV retinitis or infection of organs other than liver, spleen or lymph nodes; onset at age of ≥ 1 month)
- Extrapulmonary cryptococcosis including meningitis
- Any disseminated endemic mycosis (e.g. extrapulmonary histoplasmosis, coccidiomycosis, penicilliosis)
- Cryptosporidiosis
- Isosporiasis
- Disseminated non-tuberculous mycobacterial infection
- Acquired HIV-associated rectal fistula
- Cerebral or B cell non-Hodgkin's lymphoma
- Progressive multifocal leukoencephalopathy (PML)
- HIV-associated cardiomyopathy or HIV-associated nephropathy

Appendix D: Child PIP Code Lists

- Cause of Death
- Modifiable Factors

Child Healthcare Problem Identification Programme

Causes of Death

ChIP v2.0

Please note: The **nutritional** categories and the clinical and laboratory classifications concerning **HIV** do not appear here. They have to be captured in the relevant fields on the data sheet.

Category	Causes of Death	Code
Infections and Parasitic Diseases	Acute diarrhoea, hypovolaemic shock	101
	Chronic diarrhoea	102
	Dysentery	103
	TB: Pulmonary	110
	TB: Meningitis	111
	TB: Miliary, other extra-pulmonary	112
	Septicaemia, possible serious bacterial infection	120
	Congenital Infections (not HIV)	130
	Meningitis: bacterial	140
	Meningitis: viral (meningo-encephalitis)	141
	Other inflammatory disease of CNS (e.g. abscess)	142
	Measles	150
	Other possible serious infection (specify)	151
	Malaria	170
	Hospital-acquired infection	180
Oncology, Haematology	Tumours	201
	Leukaemias	204
	Anaemia	202
	Other Oncology / Haematology (specify)	203
Endocrine, Nutritional, Metabolic	IDDM, DKA	301
	Hypoglycaemia	304
	Other Endocrine, Nutritional, Metabolic (specify)	305
Nervous System	Status epilepticus	401
	Other Nervous System (specify)	402
Circulatory System	RHD, Rheumatic fever	501
	Heart failure, Pulmonary oedema	502
	Myocarditis	503
	Cardiomyopathy	507
	Congenital Heart Disease	504
	Endocarditis	505
	Other Circulatory System (specify)	506
Respiratory System	Croup	601
	Pneumonia, LRTI (ARI)	602
	PCP (suspected)	603
	PCP (confirmed)	608
	Pneumothorax, Pyothorax, Pleural effusion	604
	Asthma	605
	Congenital malformations of the respiratory system	606
	Other Respiratory System (specify)	607

Category	Causes of Death	Code
Digestive System	Cirrhosis, Portal Hypertension, Liver Failure, Hepatitis	701
	Surgical (appendix, hernia, intestines, peritoneum)	702
	Other Digestive System (specify)	703
Genito-urinary System	Acute nephritis	801
	Acute renal failure	802
	Chronic renal disease	803
	Other Genito-urinary System (specify)	804
Ill-defined / Unknown Cause	Ill-defined / Unknown causes of mortality	900
Other Diagnosis	Other diagnosis (specify)	901
Burns	Burns	1000
Poisoning	Paraffin	1101
	Corrosives	1102
	Other Poisoning (specify)	1103
Bites and Stings, Toxic plants	Bites and stings, Toxic plants	1200
Inhalation / Aspiration	Inhalation of foreign body or gastric contents	1300
Accidents	Transport-related accidents	1400
	Other accidents (incl. Drowning; specify)	1500
Non-accidental injury, Abuse	Non-accidental injury, Abuse-related, Neglect	1600
Homicide	Homicide	1700
Suicide	Suicide	1800

Underlying Conditions	Code
Cerebral palsy	1
Hydrocephalus	2
Birth defect (preconception = chromosomal/genetic, or post conception e.g. foetal alcohol syndrome)	3
Ex-low birthweight / preterm infant	4
Twin / Multiple pregnancy	5
Other Underlying Condition (specify)	10

Modifiable Factors

ChIP v2.0

Family / Caregiver		
Timing	F101	Infrequent clinic attendance
	F102	Delay in seeking care
Recognition	F103	Caregiver did not realise severity of illness
	F104	Caregiver refusing treatment
	F105	Home treatment with negative effect on the child, e.g. enema
Immunisations	F106	Never immunised / behind with immunisations
Nutrition	F107	Inappropriate nutrition
RTHC	F108	Not present / referral letter lost
Consents / Returns	F109	Declining HIV test
	F110	Did not arrive on day of referral / did not keep appointment
Other	F189	Other modifiable factor concerning caregiver / family (specify)
Insufficient Information	F190	Insufficient information / notes on caregiver / family care

Clinic / Ambulatory Care: Clinical Personnel		
Case Assessment	P301	Insufficient assessment for acute respiratory infection / LRTI
	P302	IMCI not used for patient assessment
	P304	Insufficient assessment for failure to thrive
	P309	Other insufficient assessment (specify)
Monitoring	P311	No weight / other inappropriate use of RTHC
	P312	O_2 saturation (at Community Health Centre)
	P319	Other insufficient monitoring (specify)
Case Management	P321	No appropriate stat antibiotics / antibiotics for acute infection
	P322	No TB contact treatment
	P323	Insufficient fluid management for gastro-enteritis with dehydration
	P324	Insufficient investigations done
	P325	IMCI not used for case management
Delay in Referring - Acute	P331	Delay in referring acute respiratory infection
	P332	Delay in referring gastro-enteritis with dehydration
	P333	Delay in referring other acute problem (specify)
Delay in Referring - Chronic	P341	Delay in referring failure to thrive
	P342	Delay in referring chronic cough
	P343	Delay in referring chronic diarrhoea
Other	P379	Other modifiable factor - clinical personnel at clinic level (specify)
Inappropriate Care by GP	P380	Inappropriate care / late referral from Private Sector
Insufficient Information	P390	Insufficient notes
Clinic / Ambulatory Care: Administrators		
Lack of Transport	C211	Home to Institution
	C213	Clinic / CHC to Hospital
Lack of Access	C222	Lack of clinic / limited opening times
	C224	Lack of high care beds / resuscitation area
Barriers	C227	Barriers to entry to healthcare
Lack of Personnel	C231	Lack of professional nurse at clinic
	C239	Other lack of personnel (specify)
Communication	C241	Communication problems: Staff to caregiver
	C249	Staff to staff communication problem at clinic or between clinic and hospital
Lack of Drugs, IV fluids etc	C254	O_2 supply / equipment
	C255	Antibiotics
	C256	Other lack of drugs, IV fluids (specify)
Laboratory	C258	Basic laboratory investigation not available (e.g. blood glucose)
Lack of Equipment	C261	Pulse oxymeter (at CHC)
	C262	Suction
	C263	Lack of other equipment (specify)
Lack of Policy	C271	Concerning short-stay for paediatric patients at health care centre
	C279	Other lack of protocol / policy (specify)
Insufficient Information	C290	Insufficient notes

Admission and Emergency (Hospital): Clinical Personnel		
Case Assessment	P401	History taking incomplete
	P402	Physical examination incomplete
	P403	Respiratory rate not taken, respiratory distress not noticed
	P404	Assessment of shock / dehydration insufficient
	P405	Appropriate investigations not done (blood, x-ray, other)
	P406	Results of investigations not noted
	P407	Not classified as critically ill by nurse / danger signs not noticed
	P409	Other insufficient case assessment (specify)
Monitoring	P411	Respiratory rate
	P412	O_2 saturation
	P413	Blood glucose
	P414	Shock
	P415	Level of consciousness, convulsions
	P419	Other insufficient monitoring (specify)
Case Management	P421	Shock not treated appropriately (e.g. intra-osseus line)
	P422	Airway obstruction not managed appropriately
	P423	Appropriate O_2 therapy not prescribed / not recorded / not given
	P424	Convulsions not managed appropriately
	P425	Appropriate antibiotics not prescribed
	P426	Other insufficient case management (specify)
Insufficient Information	P490	Insufficient notes
Admission and Emergency (Hospital): Administrators		
Lack of Transport	A211	Home to Institution
	A214	Hospital to Referral Hospital / Institution to Institution
Lack of Access	A223	Lack of hospital beds / ward overcrowded
	A224	Lack of high care beds / resuscitation area
	A225	Lack of infant / paediatric ICU facilities
Barriers	A227	Barriers to entry to healthcare
Lack of Personnel	A232	Lack of professional nurse at hospital (specify: day / night / week end)
	A233	Lack of senior doctors (post Community Service)
	A239	Other lack of personnel (specify)
Communication	A242	Staff to caregiver
	A243	Doctor not called for critically ill child
	A245	Doctor to doctor (e.g. no hand over of critically ill patient)
	A246	Doctor called, but did not respond / did not come
	A249	Other staff to staff communication problem (specify)
Lack of Drugs, IV Fluids etc	A254	O_2 supply / equipment
	A255	Antibiotics
	A256	Other lack of drugs, IV fluids (specify)
	A257	Lack of blood products
Laboratory	A258	Basic laboratory investigation not available
Lack of Equipment	A261	Pulse oxymeter
	A262	Suction
	A263	Lack of other equipment (specify)
Lack of Policy	A273	Lack of case management protocol
	A279	Other lack of protocol / policy (specify)
Insufficient Information	A290	Insufficient notes

Ward (Hospital): Clinical Personnel		
Case Assessment	P501	Physical examination incomplete
	P502	Appropriate investigations not done
	P504	Results of investigations not traced / not noted (including x-rays)
	P507	LRTI/ARI not responding to treatment, not reassessed
	P508	Other condition not responding to treatment, not reassessed
	P509	Patient not seen during week-end / public holiday
	P510	Insufficient case assessment / management at previous admission / OPD visit
Monitoring	P521	Respiratory rate / O_2 saturation
	P523	Blood glucose
	P524	Shock
	P525	Level of consciousness, convulsions
	P526	Electrolytes
	P529	Other insufficient monitoring (specify)
Case Management	P531	Appropriate O_2 therapy not prescribed / not recorded / not given
	P532	Convulsions not managed appropriately
	P533	Appropriate change / addition of antibiotics / TB Rx not prescribed
	P534	Appropriate blood product not prescribed
	P535	Other appropriate treatment not prescribed (specify)
	P536	Other case management protocol not followed (specify)
	P537	No team decision for terminal care
	P538	Prescribed treatment not given
Delay in Calling for Senior Opinion	P601	Community Service Doctor / Intern did not call senior Medical Officer
	P602	MO at peripheral hospital did not call provincial hospital / referral hosp
	P603	Other delay in calling for senior opinion
Delay in Referring	P611	To provincial hospital / referral hospital for coma / CT scan
	P612	To provincial hospital / referral hospital for other problem
	P613	Other delay in referring
IV Fluids / Intake-Output	P621	No prescription for IV fluids
	P622	IV fluids not monitored / not recorded appropriately
	P623	Too much / too little / incorrect type of IV fluids prescribed / given
	P624	No appropriate intake-output charting done
Feeding/ NG Tube	P631	NG tube feedings not prescribed
	P632	NG tube feedings not recorded / given
	P633	Other appropriate feedings not recorded / not given
	P634	Problems with NG tube feedings (e.g. cough, cyanosis)
Other	P689	Other modifiable factor (specify)
Insufficient Information	P690	Insufficient notes

Ward (Hospital): Administrators		
Lack of Transport	W214	Hospital to Referral Hospital
Lack of Access	W223	Lack of hospital beds / ward overcrowded
	W224	Lack of high care beds / resuscitation area
	W225	Lack of infant / paediatric ICU facilities
Lack of Personnel	W232	Lack of professional nurse at hospital (specify: day / night / week-end)
	W233	Lack of senior doctors (post Community Service)
	W239	Other lack of personnel (specify)
Communication	W242	Staff to caregiver
	W243	Doctor not called for critically ill child
	W245	Doctor to doctor (e.g. no handover of critically ill patient)
	W246	Doctor called, but did not respond / did not come
	W249	Other staff to staff communication problem (specify)
Lack of Drugs, IV etc	W254	O_2 supply / equipment
	W255	Antibiotics
	W256	Other lack of drugs, IV fluids (specify)
	W257	Lack of blood products
Laboratory	W258	Basic laboratory investigation not available
Lack of Equipment	W261	Pulse oxymeter
	W262	Suction
	W263	Lack of other equipment (specify)
Lack of Food / Milk	W269	Lack of food / milk
Lack of Policy	W272	For weekend / holiday ward rounds
	W273	Lack of case management protocol
	W279	Other lack of protocol / policy (specify)
Insufficient Information	W290	Insufficient notes

Appendix E: Additional Tools

- Paediatric Ward Admissions and Discharge Register
- Clerking Admission Sheet
- Child PIP Mortality Review Process Guideline

Paediatric Ward Admissions and Discharge Register

Year:_______________ Month:_______________ Ward:___________________ Hospital:__________

No.	Surname Name Folder Number	Caregiver Name Telephone Street, Town	DoB	Age	DoA ToA	From?	Weight & Gender	Nutrition status: o/n/u/k/ m/m-k	Diagnosis	DoD ToD	To?	ChIP reg y/n
Totals												

DoB = date of birth; **DoA** = date of admission; **ToA** = time of admission; **From?** = enter where patient came from (e.g. another ward, home, clinic, another hospital); **Nutrition status:o//n/u/k/m/m-k** = overweight/normal/underweight for age/kwashiorkor/marasmus/marasmic-kwashiorkor; **Dx** = admission diagnosis (enter main reason for admission but update if diagnosis changes or child dies); **DoD** = date of discharge OR death; **ToD** = time of discharge OR death; **To?** = enter where patient was discharged to (e.g. another ward, home, clinic, POPD, another hospital, died); **ChIP reg y/n** = yes/no for entry on the Child PIP death register

Paediatric patient admission sheet (to be completed by admitting doctor after usual clerking notes)

Name:					Date of Birth:	DoA:	ToA:
Admitted from					**Admitting Doctor (print)**		
Admitting to	ICU	High care	Medical	Surgical	Mixed	**Receiving Doctor (print)**	

Referred

	Name of hospital/clinic:				
Ⓨ / Ⓝ / Ⓤ	**If yes, from:**	Another hospital	A clinic	Private sector	Unknown
	If yes, from:	Inside drainage area	Outside drainage area	Unknown	

Social

Caregiver Name: **Telephone:**

Mother	Alive and well	Dead	Sick	Unknown	**Primary caregiver**	Mother	Grandmother
Father	Alive and well	Dead	Sick	Unknown		Father	Other: _____

Nutrition

OWFA	Normal	UWFA	Marasmus	Kwashiorkor	M-K	Unknown	Weight: _____kg

HIV / AIDS

Laboratory test	Negative	Exposed	Infected	No result	Not tested (but indicated)	Not tested (not indicated)	Unknown
Clinical	Stage I	Stage II	Stage III	Stage IV	Not staged (but indicated)	Not staged (not indicated)	Unknown
PMTCT	Prophylaxis given	Prophylaxis not given	Mother negative at delivery	Unknown			
Feeding in 1st 6 months	Exclusive breast for 6/12	No breast, ever	Mixed, from birth	Unknown			
Cotrimoxazole	Current	Ever	Never (but indicated)	Never (not indicated)	Unknown		
ARV (child)	Current	Ever	Never (but indicated)	Never (not indicated)	Unknown		
ARV (mother)	Current	Ever	Never (but indicated)	Never (not indicated)	Unknown		

Main diagnosis/reason for admission

Illness/Condition	**ICD 10**

Basis for diagnosis (tick relevant)

Previous diagnosis	Symptoms	Signs
Current Rx:		

Reasons for admission

1. Life-threatening problems (tick applicable)

Airway	Critical	Narrow		Normal
Breathing	Needs IPPV	Needs oxygen	Hyperventilation	Normal
Circulation	Shock	Hypovolaemia	Hypervolaemia	Normal
Deydration	10%	5%	Oedema	Normal
Consciousness	Coma	Depressed	Seizures	Normal
Infection	SIRS (“toxic shock”)	IV agent	Oral agent	No
IMCI classification	“Red”	“Yellow”		“Green”

2. Diagnostic workup (e.g. tuberculosis):

3. Social (e.g. poverty, distance, caregiver):

4. Specialist review/opinion:

5. Other:

Red flags (circle applicable)

readmission	admitted within past 28 days for the same condition
young infant	< 28 days old / 1 - 3 months
malnutrition	kwashiorkor / marasmus / wt < 3rd centile / wt for ht < 3rd centile
fever/hypothermia	temperature > 38°C or < 36°C
infection	measles, HIV, urinary tract, meningitis, pneumonia, septicaemia, other
dysentery	blood and/or mucus in stool / PR exam / fits / encephalopathy
hypoglycaemia	blood glucose < 2.6 mmol/ l

Significant biochemical problems (circle applicable)

Hypoxia	pH < 7.2	K+ < 2.0 /	K+> 6	Na+<120	Na+> 150	Albumin < 20

Urgent management

	Specific Rx	**Other Rx**
Airway	ETT:	Bag/Mechanical IPPV:
Breathing	Oxygen"	Continue on way to ward:
Circulation/Shock	Volume expand:	Continue on way to ward:
Dehydration	Rehydrate:	Check Na:
Consciousness	Protect airway:	Coma position:
Infection	IV antibiotic stat:	Steroid/antipyretic:

Initial investigations (tick for "done", circle for "to do")

Chemistry	acid-base	renal FT's	liver FT's	blood glucose	urine Na+ , K+	urine protein:creatinine
Haematology	FBC	diff	INR/PTT	retics	smear	factorVIII/IX
Microbiology	blood culture	CSF	urine dipstix	urine MC&S	stool MC&S	syphilis
Radiology	chest X-ray	abdo X-ray	CT Brain	MRI	U/S	echo
TB	skin test	CSF	Sputum AFB's	GW AFB's	**Started TB R_x:**	yyyy/mm/dd
HIV	rapid/ELISA	PCR	CD_4	**Other Virus:**		
Toxins/Drugs						

Parameters for monitoring on arrival in ward (circle "to do")

Nurse	Temperature	Respiratory rate	Sats/O_2 requirement	Respiratory pattern	Heart rate	Blood pressure	Glucose
	Weight	Urine volume	Stools	**Other:**			
Doctor	Perfusion	Acid-base	Urea, creatinine	Serum Na+, K+	Hydration		

Problem list and plans

#1:	**#4:**
Plan:	**Plan:**
#2:	**#5:**
Plan:	**Plan:**
#3:	**#6:**
Plan:	**Plan:**

Pain Assessment

No pain	Mild Pain	Moderate Pain	Severe Pain
Analgesia plan:			

Sign: _____ Date: _____ Time: _____

THE CHILD PIP MORTALITY REVIEW PROCESS

Saving lives through death auditing

It is the structured clinical audit of all children dying in hospital (including in casualty/outpatients, and those who are 'dead on arrival') that enables a thorough assessment of the quality of care that children receive in the health system.

For a clinical audit / mortality review to be successfully implemented there are two vital requirements:

1) Dedicated individuals willing to spend time and effort to make the process happen
2) A carefully structured system where roles and responsibilities are well-defined

Thus, the mortality review process in a paediatric/children's ward consists of two main activities:

1) The data collection process
2) The actual mortality review process

Data collection

To conduct a mortality review, 2 data sources are needed:

1) The ward admissions, discharges and deaths register
2) The individual clinical records of the children who die

Keep a separate register of children who die for tracing their medical records. Admission and deaths counts should be captured on **monthly tally sheets.** Detailed information on each death should be captured on the **death data capture sheet**.

To organise and keep track of the data it is helpful to compile a lever arch file, clearly labelled ChIP. It is helpful to order the contents in each section as follows:

1) Laminated copies of code lists (Cause of death and Modifiable factors), and growth charts
2) Monthly dividers for each month followed by a Monthly Tally Sheet for that month as well as a Death Data Capture Sheet completed for each death that occurred during that month
3) Spare data capture forms

The review process

Follow the four components of the mortality review process in your hospital:

Component	When	Who	Purpose
1. 24 hour review	Each death should be reviewed and summarised within 24 hours	The attending doctor or nurse at the time of the death	▪ Ensure all necessary information is captured at a time when information is available
2. Preparatory meeting	Before the Mortality Review Meeting	The doctor and nurse in charge of the ward/unit	▪ A detailed analysis of **all** deaths, with **case selection** for presentation at the Mortality Review Meeting ▪ Compilation of monthly statistics for presentation at the meeting
3. Mortality review/ChIP meeting (see below)	Weekly to monthly depending on load	Whole paediatric department (doctors and nurses) as well as clinic staff	▪ Presentation of statistics, case discussions and task reviews ▪ Assign new **tasks** based on each meeting's discussion ▪ Ensure all data capture sheets have been **completely completed**
4. Epidemiology & Analysis	6 monthly/annually	Managers and clinical personnel	▪ Broader problem identification with trend assessment, and with proposed solutions/recommendations

The 24 hour review

Every single death occurring in your hospital should be summarised using the ChIP Death Data Capture sheet at the time of death. The person best placed to do this is either the on-duty doctor or by way of handover, the daytime team responsible for the long-term care of the child. The death summary should be regarded as no more burdensome, and no less important, than the discharge summary for other children leaving the ward/unit.

It is still best to have a single person in the ward/unit making sure that this process happens.

This can be a doctor or a nurse.

The preparatory meeting

This meeting is crucial. All data capture sheets must be **completely completed,** to the stage of readiness for entry onto the computer. This means that all fields must be filled in, and **codes** must be entered where required. This makes data entry onto the computer efficient and accurate, and allows for any category of employee to enter data.

Careful selection of cases for presentation will enhance learning opportunities, and facilitate problem identification, and task definition and allocation.

The preparatory meeting is the responsibility of the most senior doctor and most senior nurse in the ward/unit.

The mortality review meeting

Mortality meetings must be well organised and managed by the nurse and doctor responsible for the paediatric/children's ward.

1) Meetings should be held weekly to monthly depending on the number of deaths.
2) A suitable time and venue is needed.
3) All staff involved with child care should be invited (doctors, nurses, allied healthworkers and administrators). Staff must understand that mortality meetings are very important. It is especially helpful to invite staff from clinics referring to the hospital.
4) Case presentations should be concise and professional. Discussion is encouraged if the presenter does not provide the cause of death and modifiable factors. This is best done by the group.
5) The meeting should by consensus establish the main cause of death and then look carefully for modifiable factors. The meeting must never become a "witch hunt", and should be confidential. The meeting should NOT be dominated by senior doctors. The thoughts and insights of **all** participants make the meeting worthwhile.
6) All decisions (causes and modifiable factors) made must be recorded on the mortality sheets (death data capture sheets) for entry later onto a computer.
7) **Problems with the process of caring for children in the hospital, the referring clinics and in communities must be identified and prioritised, and plans should be made and documented for addressing each problem.**
8) Tasks arising out of discussions around cases should be assigned to team members, and minuted. Progress with the tasks should be reviewed at the start of the next meeting.

The meeting agenda

A typical mortality review agenda is a follows:

1) Welcome and introductions, and identification of a minute taker
2) Review of tasks set at last meeting
3) Summary of last meeting's statistics
4) Summary of this meeting's statistics
5) Case presentations
6) **Task identification and allocation**
7) Closure and date of next meeting

Epidemiology and Analysis

The power of ChIP lies in its ability to provide instant feedback on child death and quality of care information to ward/unit staff. Simply by initiating this systematic review process, change will happen.

It is however important both for the identification of broader system problems and for monitoring change that 6 monthly or annual reviews are performed.

These reviews should be compiled into reports, which document both findings and recommendations arising out of the review. This is the point at which the power of ChIP can be used for communicating problems to managers. Once the process of mortality review is established in your site, the report will also look at success of implementation of, and response to, previous recommendations.

You can use the ChIP Report Proforma for guiding your report writing.

Making change happen

When making recommendations, it is important to link each recommendation clearly to specific information arising out of your ChIP review process. It is then useful to clearly define its requirements for implementation at each of the following levels:

1) Policy
2) Administration
3) Clinical practice
4) Education

Finally, responsibility for implementation at each level should be assigned, so that at the next review, implementation (or lack thereof) can be accounted for (for an example of this see "Saving Children 2005").

By conducting mortality reviews in this systematic way, we will both save lives, and improve quality of care, through death auditing.

(Adapted from Philpott and Voce: "4 Key Components of a Successful Perinatal Audit Process", Kwikskwiz #29, 2001)