EVALUATING THE CLINICAL MANAGEMENT OF SEVERELY MALNOURISHED CHILDREN — A STUDY OF TWO RURAL DISTRICT HOSPITALS

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Background. Severe malnutrition is an important cause of preventable mortality in most South African hospitals. Work recently done in two rural Eastern Cape hospitals supports the literature which shows that many deaths occur as a result of outdated clinical practices and that improving these practices reduces case fatality rates. Rapid assessment of clinical management in paediatric wards is necessary to highlight areas for improvement.

Objective. To assess the management of severely malnourished children in two rural district hospitals and to recommend improvements for their care.

Methods. Based on draft World Health Organisation (WHO) guidelines for inpatient care of children with severe malnutrition, data collection instruments were developed in conjunction with the district nutrition team to assess the quality of care given to malnourished children in two Mount Frere hospitals, Eastern Cape. Data were collected through retrospective review of case records, with detailed studies of selected cases, structured observations of the paediatric wards, and interviews with ward sisters and doctors.

Results. The combined case fatality rate for severe malnutrition was 32%. Inadequate feeding, poor management of rehydration and infection, lack of resources, and a lack of knowledge and motivation among staff were identified as areas that need attention.

Conclusion. The clinical management of severely malnourished children can be rapidly assessed to highlight areas for improvement. Involving staff in the assessment process has led to their active involvement in improving the management of malnourished children in their hospitals.

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Severe malnutrition remains a major cause of morbidity and mortality among young children in South Africa.[1-3] In rural areas, due to poor access to health services, many children are sent to hospital only after they have become seriously ill. Despite reaching hospital, however, many children admitted with severe malnutrition still die.[4]

A review of treatment practices worldwide found that many health services use discredited practices and that staff are unfamiliar with modern, effective guidelines for the management of severe malnutrition.[5] Inappropriate practices associated with high mortality include overuse of intravenous (IV) fluids for rehydration, inadequate feeding leading to hypoglycaemia and hypothermia, untreated infections, and failure to correct electrolyte and micronutrient deficiencies. Slow recovery among survivors has been shown to be associated with insufficient provision of energy and nutrients necessary for rapid catch-up growth.

Centres that have changed their treatment practices, however, have drastically reduced their case fatality rates. Hlabisa Hospital in KwaZulu-Natal reduced its case fatality rate from 20% to 6% after improving the quality of care.[6] In Brazil, implementation of the World Health Organisation (WHO) guidelines for management of severe malnutrition substantially increased rates of recovery.[7] These experiences suggest that evaluation of clinical practice is important.

BACKGROUND

Mount Frere health district is one of the four districts in region E of the Eastern Cape. It lies in one of the most under-resourced regions of the country.[8] The total population covered by the district health services is estimated to be about 280 000. There are two hospitals, Sipetu Hospital with 150 beds and Mary Theresa Hospital with 170 beds, each with two medical officers responsible for all the inpatients and outpatients.

To help develop a functional district health system, the Initiative for Sub-District Support (ISDS) of the Health Systems Trust and the Public Health Programme (PHP) of the University of the Western Cape are working in collaboration with the Eastern Cape Department of Health to develop a model district-based integrated nutrition programme (INP).[9] As

part of this initiative, a district nutrition team has been formed and trained to conduct a situation analysis of nutrition-related activities in the health district. One of the activities briefly assessed during this training was the hospital management of severely malnourished children in Mary Theresa Hospital, in Mount Frere town. The paediatric ward sister and section matron together with two of the authors (TP and DS) inspected the ward's admission register, tallying all cases labelled as malnutrition and all deaths in this group over the previous 12 months. A startlingly high case fatality rate inspired more in-depth research.

OBJECTIVE

The aim of the study was to evaluate the clinical management of severely malnourished children and to recommend improvements where appropriate.

METHODS

Development of data collection instruments

Using a summary of the WHO guidelines for management of severe malnutrition,[10] the hospital nutrition team, a subgroup of the district nutrition team, with guidance from the authors, developed checklists and other instruments for data collection. These were:

1. Retrospective record review and detailed case studies. In each hospital, and using the doctor's diagnosis based on clinical signs, a list was obtained from the ward registers of all children with a diagnosis of kwashiorkor, marasmus, or marasmic kwashiorkor admitted to the paediatric wards from 1 March 1997 to 31 March 1998. The corresponding files were then reviewed. Using a checklist, information was obtained regarding age, date of admission, diagnosis, presence of oedema, weight on admission, lowest weight during admission, treatment prescribed, number of days in hospital, outcome (discharged, died, referred, or absconded), and final weight. A detailed review of six cases, drawn at random from among the files located above, was conducted by a doctor and nurse to illustrate the general management of children with severe malnutrition.

2. Structured observations of paediatric wards. Using a checklist, observations were made regarding the cleanliness of the wards, the adequacy of toilet and bathing facilities, ward infrastructure, and availability of resources needed for the care of children.

3. Structured interviews of ward sisters and doctors. Using an interview guide, a doctor and the sister-in-charge from each hospital were interviewed about the management of malnourished children, including investigations, methods used to detect and treat hypoglycaemia and hypothermia, assessment and management of dehydration, meal frequency, drug treatment, involvement of mothers in patient care, play and stimulation of children, and discharge and follow-up procedures. In addition, semi-structured interviews with doctors were undertaken concerning the problems they encounter in treating severe malnutrition.

ANALYSIS

Data from the record reviews were analysed using Epi-Info version 6.1. Information from case studies and interviews was summarised according to common themes.

RESULTS

Record review

Of 72 records of children admitted with malnutrition to Sipetu Hospital during the study period, 12 were excluded from the analysis because of missing information. In Mary Theresa Hospital, 10 incomplete records were excluded from the total of 26. A total of 76 records were therefore reviewed.

Characteristics of the sample. Ages ranged from 6 weeks to 4 years, with 41% of children aged between 18 and 24 months. Forty-eight patients (60%) were male. The highest number of admissions occurred during February (17%) and March (16%). Three-quarters of cases had a clinical diagnosis of kwashiorkor.

Case fatality. The case fatality rates (CFR) at Sipetu and Mary Theresa hospitals were 28% and 50% respectively (Fig. 1). These rates may be an underestimate as the outcome for some children was not recorded but they were thought to have died.

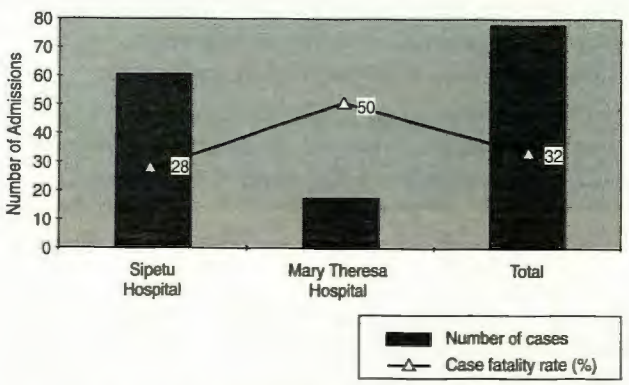

Fig. 1. Number of admissions with severe malnutrition, and case fatality rate.

Rate of weight gain. Although weighing was supposed to be done daily, of the 76 records reviewed only 61 had a weight recorded on admission, 28 had the lowest weight recorded, 40 had a final weight recorded, and only 34 cases had all three weights recorded. Of the latter, 11 lost weight and died. In the remaining 23 cases the average weight gain was very low (2 g/kg/day).

Length of hospital stay. The average stay was 15.4 days (range 1 - 60 days). Of the 25 deaths, 13 (52%) occurred within 3 days of admission.

Case studies

Six randomly selected case notes were studied in detail to provide an idea of how children with severe malnutrition are managed. Although the cases differed, common features noted were: (*i*) overuse of IV fluids; (*ii*) failure to give broad-spectrum antibiotics routinely; (*iii*) inappropriate prescription of iron during the initial phase of treatment; and (*iv*) inappropriate high-protein diet from the first day of admission.

Structured observation of paediatric wards

From the observations made, a number of shortcomings were identified.

1. Lack of resources, namely: (*i*) unavailability of baths or showers — children were bathed in a sink in the ward; (*ii*) unavailability of scales, or scales not in working condition; (*iii*) overcrowding; in some cases two children were placed in one small cot; (*iv*) dependence on electric heaters to warm the ward despite electricity supply being intermittent; (*v*) lack of staff, especially at night, contributing to inadequate care; (*vi*) no accommodation for mothers in Mary Theresa Hospital; (*vii*) no toys and books for the children; and (*viii*) no educational or health promotion materials.

2. Poor management, namely: (*i*) poor hygiene — some toilets were unflushed, bedpans were left dirty, and cockroaches and rats were seen in the wards; (*ii*) no isolation areas for infectious children; and (*iii*) poor monitoring of children's intake, output, and weight.

Interviews with ward sisters and doctors

Nurses and doctors expressed frustration regarding staff shortages and unavailability of basic supplies such as vitamin A supplements. Nurses also voiced frustration about lack of motivation, resulting in omission of certain nursing procedures. For example, one nurse said, 'We are all aware that children should be weighed every Sunday, but who will weigh a kwashy over the weekend unless very committed? Even with intake and output, unless people are reminded they won't record it, otherwise you have to do it yourself, then if you are off duty everything stops.' Nurses also mentioned that they were aware that things were not done properly but felt they had no control over the situation.

Doctors mentioned their inability to perform simple diagnostic tests. For example, one hospital had no Dextrostix, and some laboratory investigations had to be sent to distant hospitals, with a delay of up to 2 weeks in receiving the results. Doctors also expressed concern about inadequate nursing care, for example failure to record fluid or food intake, and that nurses only recorded that the baby 'is feeding well' or 'not feeding well'. Doctors felt that nurses were not eager to rehydrate children orally and gave IV fluids instead. Unwillingness of kitchen staff and some of the nurses to adapt the diet to suit the children's needs was mentioned. Follow-up care after discharge was rare owing to inadequate health service transport, poor public transport, bad roads and lack of telecommunications.

Comparison between the WHO guidelines and practices at the Mount Frere hospitals

The WHO guidelines for routine treatment consist of 10 'steps' (see below), together with prescriptive actions. The extent to which these 10 steps were practised was assessed using a combination of the above research methods.

Step 1: Treat or prevent hypoglycaemia

Recommended action. Feed every 2 hours during the day and night.

Actual practice. In both hospitals children were fed frequently up to 7 p.m. but thereafter no feeds were given until 6 a.m. With a gap of 11 hours, there was a high risk of hypoglycaemia.

Step 2: Treat or prevent hypothermia

Recommended action. Feed every 2 hours during the day and night, keep warm, and avoid exposure.

Actual practice. In both hospitals electric heaters were used to warm the wards, but the electricity supply was intermittent and the wards were draughty. Owing to lack of space, no provision was made for mothers to sleep with their babies and the risk of hypothermia at night was high.

Step 3: Treat or prevent dehydration

Recommended action. Rehydrate orally (except in cases of shock) and use a modified low-sodium rehydration solution. Rehydrate more slowly than for well-nourished children and monitor for signs of overhydration.

Actual practice. In both hospitals most children were rehydrated intravenously and were rarely monitored. If oral rehydration was done, an unmodified solution was given (60 mmol Na/l), or sugar-salt solution (1 litre of water, 8 teaspoons sugar, and ½ teaspoon salt). No potassium was added.

Step 4: Correct electrolyte imbalance

Recommended action. Give extra potassium and magnesium. Never treat oedema with diuretics. Give a low-sodium diet.

Actual practice. In Sipetu Hospital, potassium was given

routinely as Slow-K, but magnesium was not administered. In Mary Theresa Hospital, neither potassium nor magnesium was given and most children were treated with diuretics. In both hospitals children were given food containing salt.

Step 5: Treat infection

Recommended action. Give broad-spectrum antibiotics routinely as the usual signs of infection may not be present in severe malnutrition.

Actual practice. In neither hospital were children prescribed broad-spectrum antibiotics routinely.

Step 6: Correct micronutrient deficiencies

Recommended action. Give zinc, copper, folic acid and multivitamins. Give a high dose of vitamin A on day 1. Do not give iron in the initial phase.

Actual practice. Neither hospital gave zinc or copper supplements, and although multivitamins were prescribed, they were often out of stock. Both hospitals gave iron in the initial phase.

Step 7: Feed cautiously initially

Recommended action. Feed frequently with small feeds of a milk-based starter formula and continue breast-feeding. Aim for 100 kcal/kg/day and 1 - 1.5 g protein/kg/day.

Actual practice. In both hospitals, older malnourished children were given the same meals as adults but in smaller portions, and younger infants were given full-strength milk. Actual intakes were unknown. Children often had poor appetites.

Step 8: Rebuild wasted tissue (catch-up growth)

Recommended action. When a child's appetite has returned, make a gradual transition from the starter to a catch-up formula. Feed unlimited amounts frequently, aiming for an intake of 150 - 220 kcal/kg/day and 4 - 6 g protein/kg/day.

Actual practice. In both hospitals children were given the same diet throughout their hospital stay. No modification was made to achieve catch-up growth.

Step 9: Provide stimulation, play and loving care

Recommended action. Give emotional support and playful stimulation.

Actual practice. This was lacking in both hospitals. At Mary Theresa, mothers were not permitted to stay in the hospital owing to lack of space and none of the wards had toys.

Step 10: Prepare for follow-up after discharge

Recommended action. Involve parents and caretakers in the feeding and care of children and teach them how to continue at home. Follow up each child regularly to check progress.

Actual practice. In Sipetu Hospital there was a 'kwashy kraal' where children who had survived the acute phase of illness were rehabilitated and their caretakers instructed about nutrition. Some of the dietary advice, however, was not feasible for poor families. There was no training of mothers in Mary Theresa Hospital. Neither hospital had an adequate system of continuing care after discharge.

DISCUSSION

The evaluation revealed a case fatality rate of 32% in the Mount Frere hospitals. Lack of resources contributed to the poor outcome, but faulty case-management was also identified. Many children died during the first few days of treatment, likely causes being missed infection, hypoglycaemia and hypothermia due to lack of night feeds, cardiac failure due to overhydration from IV fluids, and electrolyte imbalance due to use of diuretics. There was a lack of understanding that severely malnourished children are different physiologically and metabolically from well-nourished children, and that consequently they need to be treated differently.

The rapid assessment approach was successful in highlighting areas needing improvement. Data collection was completed in 4 weeks and data analysis took a further 6 weeks. The evaluation team included hospital nursing staff as well as external members and they participated together, starting with the development of the data collection instruments, then carrying out the assessment, and finally identifying improvements needed. This approach has the added advantage of establishing 'ownership' of the process by the hospitals concerned and a desire to see the planned improvements implemented. As a result of this review, staff were able to recognise their shortcomings and the need for training. Training sessions are now in progress and a standard protocol based on the WHO guidelines and appropriate to the district's limited resources has been jointly developed with the staff. The team has already rectified many of the identified problems and is working hard at ensuring implementation of all the steps.

Preliminary analysis undertaken 6 months after commencing the training sessions showed a reduction in case fatality rates in both hospitals, and it is anticipated that significant further improvement will occur. Subsequent papers will present further results on the evaluation of the project.

Long-term, sustainable improvements in the care of malnourished children require that paediatric staff, dietitians, pharmacy and kitchen staff, and administrators identify shortcomings in case management, and, where appropriate, undergo training to improve their skills and knowledge. Improving the quality of care is an important challenge facing the health services. This study has shown that hospital staff, even in the most underresourced areas, have the ability to identify and begin to rectify poor practices.

It is likely that similar problems of high malnutrition case fatality rates due to inappropriate clinical management exist in other South African hospitals, particularly at district level. It is therefore recommended that a similar process be undertaken in other provinces and regions.

None of the children was tested for HIV. Treatment in such cases remains essentially the same, although the outcomes are different. However, as the experience in Hlabisa has shown,[4] the HIV epidemic can have an important impact on outcomes for these children. The evaluation of the further impact of this intervention will have to take into account the rising number of HIV-positive children in this area.

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CRANIOCEREBRAL GUNSHOT INJURIES IN SOUTH AFRICA — A SUGGESTED MANAGEMENT STRATEGY

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Objective. To determine the outcome of craniocerebral gunshot injuries, analyse factors that affect prognosis and suggest a management protocol.

Design. A retrospective analysis of civilian craniocerebral gunshot injuries treated over a 7-year period.

Setting. Groote Schuur Hospital's neurosurgery and trauma unit service.

Patients. One hundred and eighty-one patients with craniocerebral gunshot injuries were admitted to the Department of Neurosurgery, Groote Schuur Hospital, University of Cape Town, over a 7-year period and a retrospective analysis of these patient records with regard to outcome and prognostic factors was carried out.

Results. Seventy-six patients sustained non-penetrating injuries, 8 (11%) of whom had underlying cerebral injury on computed tomography (CT) scan. The prognosis was good in the case of non-penetrating injuries. One hundred and five patients sustained penetrating injuries and 57% (62) had a poor outcome. A Glasgow Coma Score (GCS) of 5 or less following resuscitation was associated with a 98% mortality rate. CT scan evidence of transventricular injury was associated with 100% mortality, bihemispheric injury with 90% mortality, and diffuse cerebral swelling with 81% mortality.

Conclusion. Patients with non-penetrating craniocerebral gunshot injuries should all undergo a CT scan as 10% will have cerebral injury. The prognosis is normally good. In penetrating craniocerebral gunshot injuries a GCS of 5 or less, or a GCS of 8 or less with CT scan findings of transventricular or bihemispheric injury have such a poor outcome that conservative treatment is indicated.

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