ADMISSION PATTERNS AND OUTCOMES OF YOUNG INFANT IN RESOURCE DEFICIENT HOSPITALS

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ABSTRACT

To calculate incidence of admission and mortality pattern in admitted young infants and to identify measures to assess and evaluate performance to the existing hospital services to improve facilities and inpatient care. This was a descriptive study (Longitudinal hospital based study) in Paediatric Department, Misurata teaching hospital, from January 2012-December 2012. All hospital admissions, of young infant who presented to paediatric department with clinical symptoms justifies admission are included in the study. Sick infants were routinely investigated according to a standard protocol. The clinical care during admission was supervised by a consultant paediatrician who was also responsible for assessment and assigning the final diagnosis at the end of the admission after review of the case notes and the results of all relevant investigations. There were a total of 384 young infant admitted into the paediatric department during the study period. Thirty four infant deaths were recorded (8.9%) from the total young infant admitted during this study. Presumed serious infections were the commonest cause of admission among infants <2 months of age (41%), followed by Pneumonia (aged 30–59 days) at 30.7% from total admission of young infants. Mortality in severe infection was 12.6% from total admitted cases of this group but account for 58.8% from total mortality in young infant. our data suggest that strategies to tackle the problem of infection in young infant by prevent or treat infection may be of great benefit if we consider value of community based diagnosis and care. I believe that the discussion of mortality cases provides an adequate means of changing practice patterns which needed to reduce the mortality in young infant.

KEY WORDS: Resource Deficient Hospitals, Mortality, Young infant, Severe infection.

INTRODUCTION

Children hospitals are adept at managing the medical needs of ill children, providing continuity of care, and developing effective relationships with other health care team members. Ideally, specialists significantly enhance the quality of health care provided to individual children. In response to the increasing emphasis on delivering cost-effective and high-quality health care, many hospitals have implemented clinical pathways and protocols that rely on evidence-based guidelines for a variety of common, predictable inpatient illnesses and procedures. Hospitals with low resources need continuous evaluations to develop practical and sensible guidelines according to the facility provided to improve the quality of health care delivered to children in the inpatient setting.

Quality of care has assumed its rightful place as a central focus of health care delivery and management. The increased attention to quality arose from abundant evidence that health care in developing countries suffers from serious and pervasive quality-related problems that have staggering effects. When we talk about quality of care we should define six specific aims for the health care system, now widely conceived as the critical dimensions of quality. Health care should be: Safe, Effective, Efficient, Patient centered, Timely, and Equitable[1]. Effectiveness refers to the reliable delivery of care that is likely to achieve desired results (i.e., care consistent with evidence). Evidence-based medicine and clinical practice guidelines, respectively, provide an orientation to the delivery of effective care. Guidelines must be coupled with effective strategies to incorporate evidence into clinical practice[2,3].

The work in resource deficient hospital is totally different. Ideally, measures should be derived from data collected routinely in the course of care, such as health records or ongoing patient surveys, but in most cases, it must be supplemented by project-specific data collection and analysis. Importantly, data should be plotted and tracked over time but they should not be kept hidden for evaluation-oriented before-and-after studies. A typical improvement studies uses some important measures, including measures of the processes of care (was the right thing done?), the outcomes of care (did the right result occur?), and potential adverse outcomes (was there unintended harm?). In hospitals with limited resources, efforts to improve pediatric patient safety are important which have been hampered by different factors. Although many mecha-

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nisms exist by which patient safety principles can be taught, one of the most effective may be the morbidity and mortality (M&M) review process. These reviews had been a part of some hospital practice for generations, and it is to discuss adverse outcomes.

There is no standard blueprint for the ideal pediatric M&M review process. One must take into account the size and type of hospital, the policies of the institution, the time and resources available. As we talk about our limited resource hospital, we are in a weak position to deal with some of these issues. Studying the outcomes and effectiveness of M&M reviews is important and can serve as a vehicle for introducing changes.

Young infant mortality is well recognized world wide. Every day, more than 26,000 children under the age of five die around the world, mostly from preventable causes[4]. The vast majority of them live in the developing countries and more than one third of these children die during the first month of life[4]. In addition World Health Organization 2000–2003 report, estimate that young infant sepsis and pneumonia are responsible for about 1.6 million deaths each year, mainly in resource-poor countries[5].

AIM OF STUDY

This study is aimed at evaluating the mortality pattern in young infant in our Hospital and to identify measures to assess performance. The information obtained from this study would be used in re-evaluating existing services and in improving facilities and patient care.

To calculate incidence of admission and mortality pattern in admitted young infants and to describe the factors that probably affect the mortality rate in our hospital.

PATIENTS AND METHODS

This was a descriptive study (Longitudinal hospital based study) in paediatric department, Misurata teaching hospital, from January 2012-December 2012. All hospital admissions, of young infant (under the age of two month) who presented to paediatric department with clinical symptoms justifies admission are included in the study. Prospectively collected data on admitted cases include; history, clinical examination, investigations, and treatment (Details of relevant clinical information, investigation, and treatment are recorded on a data collecting form). Data from 200 young infant are expected to be available for analysis (190 subjects are estimated, with precision of ±5 % using a 95 % confidence interval).The sample size is increased to allow for possible loss. The SPSS is used for data analysis.

Young infant admitted to hospital department are presented to hospital paediatric outpatient department (OPD) transferred usually from dispensary, private hospital or clinic or directly presented with their parents to hospital paediatric OPD.

In our study the following definitions were adapted:

Young infant are infant less than 60 days old. The neonatal period begins with birth and ends 28 complete days after birth.

Prematurity includes children admitted up to the age of 30 days for whom their immaturity was considered the major problem. (Preterm Less than 37 completed weeks (less than 259 days) of gestation).

Term From 37 completed weeks to less than 42 completed weeks (259 to 293 days) of gestation.

Post-term 42 completed weeks or more (294 days or more) of gestation. Low birth weight (LBW) Less than 2500g (up to and including 2499g). Sepsis diagnosis was based on the clinical features with or without positive culture or abnormal biochemical analysis. Severe infection includes the clinical categories, neonatal sepsis, severe infection/pneumonia, and meningitis. Pneumonia includes children for whom the clinician felt able to make a firm clinical diagnosis of pneumonia rather than the less specific "severe infection".

Criteria of admitted young infant babies in paediatric department, Misurata Teaching Hospital:

1- Presence of respiratory distress signs whatever the birth weight or gestational age.
2- Clinical signs suggestive of a coexisting acute systemic illness (e.g. meningitis, sepsis).
3- Birth weight less than 2KG.
4- Neonate with presence of maternal risk factors which include, evidence of chorioamnionitis (laboratory or clinically), prolonged premature rupture of membrane (PPROM) > 24.
5- Young infant with pyrexia.
6- Major congenital malformation.
7- Symptomatic congenital heart diseases.
8- Infant of diabetic mother.
9- Pathological jaundice or jaundice with positive family history of exchange transfusion.
10- Birth Asphyxia [1, 5- minute Apgar score of 0-3, hypoxic ischemic encephalopathy (altered tone, depressed level of consciousness)].

We adapt the WHO clinical signs that predict severe infection in infants presenting to our hospitals[6].

These included

1- Fever, hypothermia, inability to suck.
2- History of convulsions.
3- Lower chest indrawing, crepitations, sustained fast breathing or cyanosis.
4- Failure to arouse with minimal stimulation, history of change in activity.

Interventions

Sick infants were routinely investigated according to a standard protocol with a full blood count, blood culture, plasma electrolytes, creatinine, and glucose. Total serum bilirubin was measured in all visibly jaundiced infants. Lumbar puncture was performed as part of the routine "septic screen" in all neonatal admissions with suspected sepsis and otherwise according to locally agreed clinical criteria based on those used in the WHO multicentre study of young infants[7]. Chest radiography was done when indicated clinically.

Hospital treatment available

Included oxygen, antibiotics, intravenous fluids (not parenteral nutrition), nasogastric feeding of expressed breast milk, phototherapy, and exchange transfusion. During the study an incubator was routinely available. Empiric management of suspected severe infection was with 3rd generation cephalosporin and gentamicin.

The clinical care during admission was supervised by a consultant paediatrician who was also responsible for assessment and assigning the final diagnosis at the end of the admission after review of the case notes and the results of all relevant investigations. Determining the precise diagnosis in young infants is problematic sometimes. Thus severe illness in a premature infant may be due entirely to immaturity (for example, the development of respiratory distress) or secondary to infection to which they are predisposed on account of their immaturity. The final diagnosis assigned represents an experienced pediatrician's view of the most probable primary pathological event on which secondary pathological events might be superimposed. All young infants were invited back after discharge for a follow up appointment according to their discharge diagnosis.

RESULTS

There were a total of 384 young infant admitted into the paediatric department during the study period. Based on the results, these young infants represented 32.5% of all paediatric admissions (1182 patients) and 58.6% of paediatric deaths during this period. Thirty four young infant deaths were recorded (8.9%) from the total young infant admitted during this study. These were made up of 18 males and 16 females giving a ratio of 1.1:1.

Fifty eight children in all age groups died in our hospital during the study period which account for 4.9% from total hospital admission. Accepting the inherent limitations in the diagnostic process, the observed Although 30.7 % of all admissions less than 2 months of age were diagnosed as Pneumonia (aged 30–59 days) (table 1) but infant death account for only 1.7% from total admission in patient diagnosed with pneumonia in age 30-59 days (table 2). Fourty patients were admitted as cases of birth asphyxia which approximately 10.4% from the total hospital admission of young infant (table 1) and about 7.5% of these patients were died (table 2).

DISCUSSION

Child mortality is a sensitive indicator of a country's development and telling evidence of its priorities and values[8]. Deaths have been reported to be more in poor resource hospital settings on which malnutrition and infection-related diseases have resulted in childhood deaths.

Since 1990, impressive progress has been made in improving the survival rates and health of children, even in some of the poorest countries[9]. However it is worrisome to note that high rate of infant and child cause specific patterns of admissions and mortality are presented in (table 1) and (table 2). Presumed serious infections were the commonest cause of admission among infants <2 months of age (41%) (table1), followed by Pneumonia (aged 30–59 days) at 30.7% from total admission of young infants.

(Table 1) Prevalence of major diseases in admitted young infant <60 days of life

Disease	% & No.
Severe infection	41 (158)
Prematurity	7.5 (29)
Pneumonia (aged 30–59 days)	30.7 (118)
Birth asphyxia	10.4 (40)
Major congenital abnormalities	3.3(13)
Others	6.8(26)

In the majority of cases of severe infection, it was not possible to identify a focus of infection. However, clinicians felt more confident distinguishing pneumonia from other infections in infants older than 1 month.

Mortality in severe infection group account for 58.8% from total mortality in young infant. Premature infants in this group accounted for 7.5% from the total hospital admission of young infant (table 1), and 24% of them were died (table 2) but only represent 20.5% from deaths in those under 2 months of age.

(Table 2) Prevalence of mortality in admitted young infant <60 days of life

	No. of admitted cases	% of mortality & No.
Severe infection	158	12.6 (20)
Prematurity	29	24 (7)
Pneumonia (aged 30–59 days)	118	1.7 (2)
Birth asphyxia	40	7.5 (3)
Congenital abnormalities	13	15.4 (2)

morbidity and mortality is still one of the greatest challenges facing most of the developing countries[8]. In our hospital department, total mortality in different age group during the study period is 4.9 % which lower than the 6.8 % observed in other developing countries[10].

Although infants less than 2 months of life comprise a 32.5% of our hospital admissions, they contribute disproportionately to 58.6% of paediatric deaths to inpatient paediatric mortality. Thirty four young infant deaths were recorded (8.9%) from the total young infant admitted during this study. If we compare it to other studies that shows that mortality rates for young infants in developing countries depend partly on the level of hospital resources and health facility, ranging from 5.4% in the WHO young infant study[7] to18% among those admitted to district or provincial hospitals[11,12]. Higher rates of mortality might be expected in referral hospitals because in general sicker infants will be referred.

Pneumonia (aged 30–59 days) are seen in 30.7% of young infant admitted to hospital (table 1) and mortality in this group is rare, which about 5.8% from total mortality in young infant(table 2). Birth asphyxia is a less common problem attributed to young infant mortality in our setting than might be anticipated (table 2). This is probably because, some of asphyxiated infants die in private hospital before transferred to our hospital, is possible explanation.

If we look to our study we found severe infection is the commonest reason of admission in young infant (table 1) and the mortality in these group about 58.8% from total mortality in young infants (table 2). In part this high mortality may be explained by the difficulties of sustaining even appropriate, basic levels of supportive care with limited personnel and resources in a setting designed to cope with less than half the number of admissions than are actually received.

Analysis of discharge data from more than 5 million pediatric hospitalizations revealed that sepsis and infection were common events among hospitalized children[13]. Children who had infections were found to have an increased median length of hospital stay, higher direct health care costs, and greater in-hospital mortality. These findings persisted even after adjustment for patient and hospital characteristics. The true burden of bacterial infections in our hospital settings is also unclear, because many clinical bacterial infections may present with RDS or in preterm babies and birth asphyxia who can acquire hospital infections which account for high rate of mortality.

Studies have reported rates of hospital infections that are 3–20 times higher in resource poor than resource-rich countries[14].The most common reported organisms are Gram-negative bacilli and S aureus[14]. Nosocomial infections are the single most common adverse event experienced by hospitalized children especially young infant. Recent data suggest that as many as 10% of patients develop nosocomial infections during admission to an acute care hospital[15]. Hospital-acquired infections increase morbidity, extend hospital stays, and raise hospital charges, and they are also associated with substantial increases of in-hospital mortality. To prevent these infections, however, a number of simple care practices that can reduce the probability of an infant developing a hospital-acquired infection. These include elimination of overcrowding and understaffing, careful preparation and storage of infant formulas, decreasing the number of venipuncture, sterilization of resuscitation bags and masks, and use of sterile suctioning techniques. Because many episodes of bacteremia are associated with indwelling lines or mechanical ventilation, common sense dictates avoiding their use or minimizing the number of catheter or ventilator days. All what we mention before are difficult to apply in our resource deficient hospital. What we can do to prevent infection in our hospital probably are the care practices that are likely intended to start early enteral feedings, use of human milk feedings, sterile insertion techniques by skilled personnel and dressing changes with careful disinfection of the insertion site and care of the hub, careful preparation of intravenous fluids and blood products. Hand washing and degerming (using an alcohol-based hand rub with emollient) remain the simplest and most effective methods of preventing transmission of infection from clinicians to young infants which usually not done.

There are problems in assigning a single diagnosis to sick young infants, particularly where facilities for investigation are limited. In addition one of the possible limitations of this study was the inability to identify the agents of infections in our hospital and their antibiotic susceptibility patterns because the majority of treated young infant are clinically septic babies but with negative blood culture. Therefore, while it is possible that absence of this data means the "cause" of death or illness is misclassified in some cases. We feel the spectrum of disease presented here is likely to be representative of that in district hospitals in many areas of Africa with a similar hospital sitting. While accepting that some misclassification is inevitable in our study, we believe our data provide valuable insight into the clinical challenge of caring for sick young infants faced by similar resource deficient district hospitals in the region.

In previous study in our hospital, 2005 (unpublished) shows preterm sepsis account for the bulk of preterm death in our neonatal unit. About 53% of preterm death associated with sepsis and commonly associated with hospital-acquired neonatal infections. Whilst poor hospital facility, shortage of nurses, and heavy resistant microbial colonization are major risk factors for young infants infections. Young infant who were infected require prolonged hospital admission with high risk of mortality. There is no doubt that use of antibiotic is effective and important to reduce the young infant mortality, but treatment strategies had not been implemented widely and consistently in our hospital.

Other factors that probably increase mortality in infected young infant is likely the resistance that present to the usual antibiotic used in treating infection. Antibiotic resistance is an important problem in resource poor countries[14,16,17,18].

A number of studies in health maintenance organizations, academic medical centers, and children's hospitals comparing hospitalist programs to traditional inpatient care systems in preventing and treating infection have shown a decrease in hospital charges, costs, and length of stay[19,20,21,22].

Our hospital had limited diagnostic and treatment resources (e.g. new generation antibiotics, mechanical ventilator, presence of surfactant, lacking of diagnostic laboratories and radiological facility) which all underprovided and probably increase the burden of mortality in young infant.

Young infant mortality reports are very important. In our hospital we have no mortality reports (MR). Barriers to performing appropriate MR reviews include the

anxiety of acknowledging individual error, potential loss of respect, and fear of legal action. Learning from one's errors is important, but confronting them is difficult, especially in front of a group of peers. Harbison and Regehr believe that MR reviews could be improved by decreasing defensiveness and blame[23]. MR reviews should be mandatory for all inpatient pediatric units to ensure that the care provided was timely and appropriate, to learn from the event, and to develop new knowledge and improved systems of care. Reviews should emphasize learning and the prevention of similar occurrences. Every mortality and significant morbidity should be reviewed in a timely manner. Cases should be selected both for their individual educational value and to expose attendees to a broad range of patient safety themes. Speculation and the language of blame should be avoided; reviews should emphasize "systems" rather than "individuals," and should be "confidential."

CONCLUSIONS AND RECOMMENDATION

Our hospital based study measures the admission patterns and outcomes of young infants which probably a reflection of what is obtainable in a community at large. Therefore, data obtained from our study is important in re-evaluating existing services and in improving facilities and patient care.

The vast majority of young infant's mortality is secondary to severe infection like sepsis, which usually increased when resources are deficient. Targeting the causes of young infant mortality is very important issues to reduce the mortality rate. However, although it is true that dysfunctional health systems is adversely affect child health in many hospitals (including our hospital), this is relatively difficult to change in the short term.

Although our study is hospital based, our data suggest that strategies to tackle the problem of infection in young infant by prevent or treat infection may be of great benefit. In addition, gaps in the system of communication and referral from primary health centre and private clinics to our hospital should be addressed.

To achieve the goals of improving patient safety and effectively educating staff, relevant mortality cases need to be presented and discussed in an appropriate manner. Often, minimal attempts are made to ensure the complete identification and reporting of complications. I believe that the give-and-take of the discussion of mortality cases constitutes effective peer review and this provides an adequate means of changing practice patterns when needed.

Systems for developing both clinical practice guidelines and associated outcome measures will act to create evidence-based cultures that improve the quality of health care delivered on pediatric inpatient services in low resource hospitals.

In addition the results of this study offers compelling support for using further researches to identify the more effective measures to save young infant lives, for example hand washing, reducing overcrowding of patients and provide adequate number of paediatric nurses, careful preparation of infant formula, decreasing the number of venipuncture, use of sterile suctioning techniques, early enteral feedings with human milk feedings, careful disinfection of the insertion site, careful preparation of intravenous fluids and blood products. These measures should be applied in our clinical practice and further researches should be done to see the effect of these practice changes in reducing hospital infection and mortality in young infant in our hospital.

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