

MORBIDITY AND MORTALITY PATTERN OF HOSPITALIZED CHILDREN WITH MEASLES AT MAYO HOSPITAL, LAHORE (EPIDEMIC 2013)

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ABSTRACT

BACKGROUND:

Major outbreak of measles took place in Punjab recently (2013), leading on to increase in hospitalized cases of measles in children wards, with unacceptably high morbidity and mortality. The aim of this study was to find out morbidity and mortality pattern of hospitalized cases of measles and associated factors.

DESIGN:

Prospective case series conducted at Pediatric Department Mayo Hospital, Lahore for 7 months, i.e. from 1st Jan to 31st JUL 2013

METHODS:

A total of 628 cases of measles were admitted in the children ward, Unit II, Mayo Hospital, Lahore from Jan-Jul 2013. The diagnosis was assigned using WHO criteria. Cases were admitted through emergency on 24 hour basis and managed in HDU and Measles isolation section. Chest X-Ray and blood complete examination was done in all cases. Complications were noted and managed along with eye consultations where necessary. Data was recorded in a predesigned proforma and entered in computer.

RESULTS:

628 admitted cases were enrolled, with comparable sex distribution, having mean age 30.8±26.25 months and mean weight 9.69±4.14 Kg. Eighty three percent cases were below 6 years of age (33% <1 year), 71% cases were under weight and 68% were wasted (WHO classification). Sixty six percent cases had not received measles vaccination, 144 (23%) cases had received a single dose and 71 cases (12.2%) had received two doses before admission. Majority of cases belonged to Lahore city and its peri-urban areas (83%). Pneumonia (80%), diarrhea (37%), and encephalitis (7.7%) were common complications. Eye complications (corneal ulcers, keratitis, perforation and blindness) were seen in 7.3% cases. Being under weight, H/O improper measles immunization, presence of anemia,

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pneumonia and encephalitis were statistically significant risk factors for mortality. The case fatality rate was 8.76%.

CONCLUSION:

Recent Measles outbreak further highlights the importance of strengthening the need for routine and mass vaccination for all children. In a susceptible population of children with malnutrition and low vitamin A coverage, the routine EPI coverage (above 90%) is the single most important preventive factor for prevention of further epidemics in future.

KEY WORDS:

Measles, Epidemic, Measles related mortality

INTRODUCTION:

Measles is a highly infectious disease of mankind with significant disease burden and unacceptable mortality.⁽¹⁾ Since measles is a vaccine preventable disease, an effective live attenuated vaccine is a part of Expanded Program of immunization (EPI) in Pakistan since 1978.⁽²⁾ Measles related mortality in Pakistan initially fell as a result of effective vaccination campaigns, but alarmingly high number of cases are being reported in recent years. The most important underlying factor linked to this trend is falling EPI routine coverage.⁽³⁾ World Health Organization (WHO) since 2006, has been recommending two dose of measles vaccination for adequate protection; however, the level of optimal coverage is far below the targets.⁽⁴⁾ The current status of malnutrition in pediatric population is an important factor in lowering the immunity and higher morbidity & mortality.⁽⁵⁾ Vitamin A has been shown as important factor in improving epithelial integrity and local mucosal defences and recommended to be given to children below 5 years along with national immunization days.⁽⁶⁾ These two factors combined together have created favorable conditions locally for an impending measles epidemic. It was no surprise that an epidemic of measles affected the province of Sindh in 2012-13 in rural and urban areas with high morbidity and mortality.⁽⁷⁾ Unfortunately, mass vaccination campaign was not implemented in the province of Punjab timely, leading on to increasing number of cases during months of March till July 2013.

The objective of this article is to study the epidemiologic features of the hospitalized cases of measles, disease morbidity pattern and complications during current epidemic.

MATERIAL & METHODS:

This cross sectional analysis was carried out for all consecutively admitted cases of measles at Department of Pediatrics Unit II at King Edward Medical University/ Mayo Hospital, Lahore from 1st Jan to 31st Jul 2013. The unit has round the clock services for bedside monitoring, portable radiology, lab facilities including blood gas analysis, and supervision by senior residents and consultants. After initial assessment and stabilization in emergency, the cases were managed in Measles Isolation section, and if required, shifted to High Dependency Unit of pediatric ICU. The diagnosis of measles was based upon clinical features (fever, cough, coryza, conjunctivitis, Koplick's spots and typical rash) and evidence of contact with a measles case; however no serologic tests were done. Detailed information including epidemiologic data, vaccination history and growth parameters were recorded in a specially designed proforma. The clinical course was closely monitored and important complications were noted along with outcome. Investigations like CBC, and Chest radiographs were done in all cases. Complications like Pneumonia and diarrhea were diagnosed according to IMNCI criteria. Measles encephalitis was labelled when fits and deteriorating level of consciousness supervened. Eyes were daily examined for findings of purulent conjunctivitis, corneal dryness, haziness, ulceration and rupture; confirmed by the ophthalmologist where necessary.

The data was analyzed using SPSS version 15. Various variables were shown as tables and bar diagrams. The frequencies are recorded in numbers and percentages. P-value <0.05 was taken as significant.

RESULTS:

A total of 628 cases of measles were included in study. They were diagnosed on the basis of criteria mentioned earlier. They belonged to both genders almost equally. The mean age and weight are shown in Table I. Five hundred and eighty eight (83%) cases were below 6 years of age, including 212 (33%) infants. (Figure 1) According to NCHS growth charts, 71.5% cases were under weight (weight for age <5th percentile) and 68% were wasted (weight for height <5th percentile). Sixty six cases (413) had not received immunization

against measles while 215 cases had received single (144) or two doses (71) of measles vaccine. A vast majority (83%) belonged to Lahore and its suburbs. The mean stay of admitted cases was 3.7 ± 2.83 days. The case fatality rate was found as 8.76%.(Table 1).

Table I: Demographic features of study case (n=628)

		Frequency	Percentage
Gender	Male	315	50.15%
	Female	315	49.80%
Age distribution (month)		30.8±26.25, Range: 4 Month – 12 Years	
Duration of stay (days)		3.73±2.83, Range: 0.4-23	
Cases with Weight for Age<5% Percentile		449	71.5%
Cases with Height for Age <5% Percentile		181	28.82%
Case with Weight for Height < 5%Percentile		423	67.35%
Prior contact with Measles Case		296	47.13%
Vaccination status	No Vaccine	413	65.76%
	Measles 1	144	22.9%
	Measles 2	71	11.3%
Contact with a TB case		51	8.12%
Place of Residence	Lahore	520	82.8%
	Outside Lahore	108	17.2%
Outcome	Discharge	522	87.9%
	Died	55	8.76%

Figure 1

Diagram showing Age distribution of Study Cases (n=628)

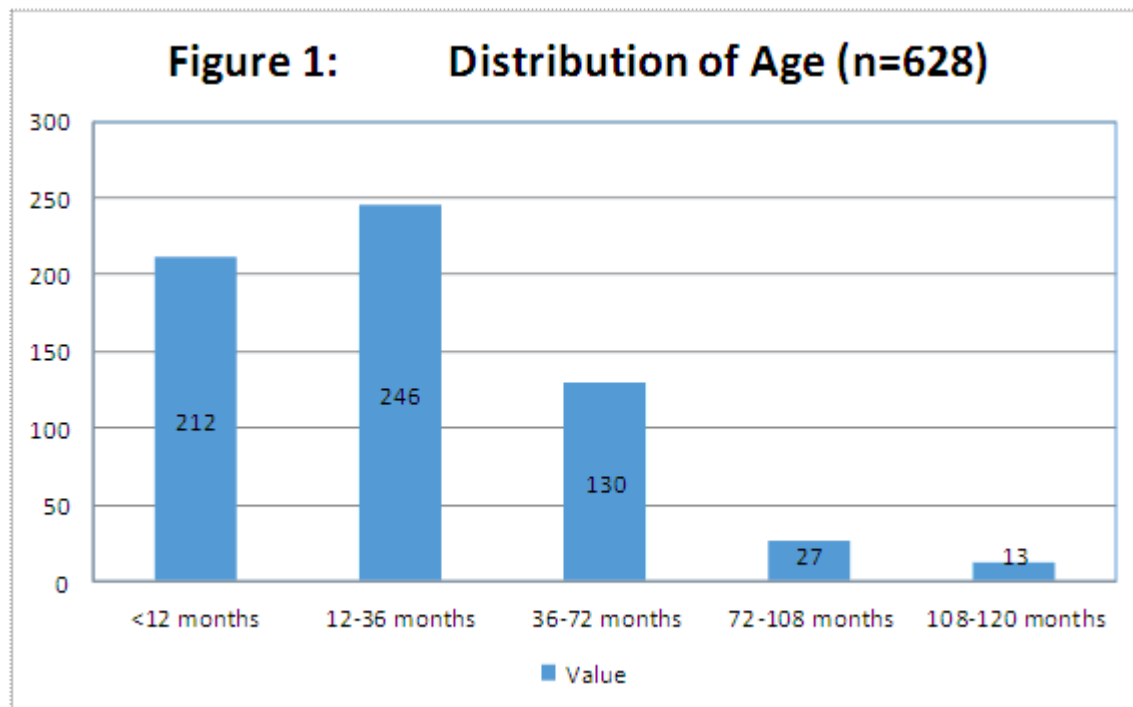
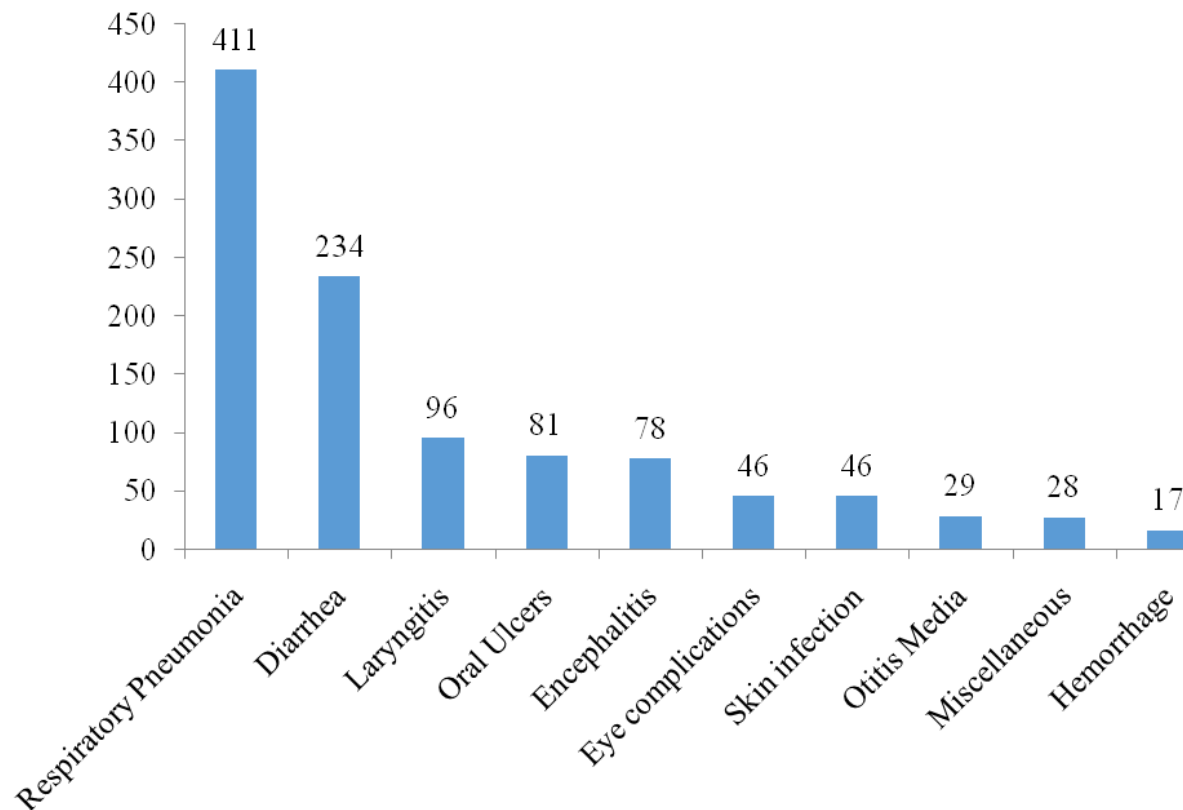


Table II: Comparison of study cases on basis of outcome (n=628)

	Died	Survived	p-value
N	55	552	
Age in Months	29.78±26.52	30.83±26.25	0.777
Weight for age <5%	47(85.5%)	404 (68.9%)	0.047*
Height for Age <5%	16 (29%)	164 (25.6%)	0.923
Weight for Height <5%	40 (72.7%)	410 (65%)	0.802
Stay (days)	4.03 ±3.79	3.73±3.68	0.576
No Vaccination	47 (85.45%)	402 (72.8%)	0.041*
Hemoglobin (G/dl)	8.1±1.99	9.22±1.74	0.000*
Pneumonia	46(83.63%)	365(66.12%)	0.008*
Encephalitis	28(51%)	50(9.05%)	0.000*

(variable with P-value <0.05) taken as significant and shown with *)

Figure 2: Analysis of Complications in Study Cases

Pneumonia, Diarrhea, laryngitis and encephalitis were most commonly observed complications. Eye complications like eye corneal ulcers, keratitis, perforation and blindness were seen in 7.3% cases. Being under weight, lack of measles immunization, anemia, pneumonia and encephalitis were statistically significant risk factors for mortality.

DISCUSSION:

Measles is an ancient foe of mankind claiming 158,000 childhood deaths worldwide in 2011. Unfortunately more than 95% of measles deaths occur in resource poor countries.⁽⁸⁾ In Pakistan, it was reported that about 20,000 children die of measles annually.⁽⁹⁾ About 50% cases were seen among vaccinated children with a significant number (22-32%) during infancy.⁽¹⁰⁾ Until recent past, measles was still among top five causes of under-five mortality in developing countries.⁽¹¹⁾

Five hundred and eighty eight (83%) cases were below 6 years of age, including 212 (33%) infants (Fig.1). Disease at young age refers to poor vaccine coverage in a community. Recent epidemics in high coverage countries are clustered and among higher age groups.⁽¹²⁾ Measles containing vaccine (MCV) has shown as best effective at 0-4 Yr age.⁽¹³⁾ Newborn antibody levels are correlated with the antibody levels in the mother and protects the bay before 1st dose of vaccine.⁽¹⁴⁾ Subsequent waning off the maternal antibody levels in infants leave them susceptible to early infections. So the timing of first dose of vaccine can help to keep this period as short as possible. This is important because risk and severity of measles in European children <1 Yr are higher than those aged ≥ 1 year.⁽¹⁵⁾

In this case series of 628 cases, 413 (66.6%) had never received measles vaccine. Only 71 (11%) cases had received two doses. A two dose strategy has resulted in 71% drop in measles related mortality and morbidity world over.⁽⁵⁾ In fact the disease had been eliminated in Americas in 2002.⁽¹⁶⁾ The dream of global elimination, however is still alluring the stakeholders of child health. Vaccine coverage of above 95% is recommended to eliminate measles from a region.

These recommendations apply equally true to Pakistan and other developing countries. Measles vaccine was available as part of EPI package as

early as 1978.⁽¹⁷⁾ The coverage has been non uniform and so is the benefit. After adapting to a two dose strategy in mid-2007, a significant drop of cases was noted for next 2-3 years.⁽¹⁸⁾ However, there is wide difference of recommended targets (> 90%) and actual coverage (<60%) of target population. This stands the best explanation of recent upsurge.⁽¹⁹⁾ Lack of vaccination was a statistically significant risk factor for mortality in our analysis. (p-value<.05). The goal of measles elimination as planned for Pakistan by year 2015 remains distant.

The sex distribution in this series was almost equal. The medical literature variably describes male to female predominance. A recent series described M:F ratio of 42:58.⁽²⁰⁾ while Qaisar et al showed a 3:1 ratio.⁽²¹⁾ This variability reflects poor access to medical facilities and gender bias in a society^{(21, 22).}

There are obvious favorable factors operating for an epidemic in Pakistan. Most of our patients were underweight and wasted (71% & 68% respectively). Malnutrition is a silent emergency and related to high mortality and morbidity due to common childhood illnesses.⁽²³⁾ Malnutrition contributes to under 5 year mortality in nearly 45% cases in developing countries.⁽²⁴⁾ The relationship between malnutrition and communicable diseases like measles is well established and seen in other resource poor countries as well. The amplitude of morbidity and mortality enhances in presence of malnutrition.⁽²¹⁾ Being under-weight was also a statistically significant risk factor for mortality in our case series. (p-value<.05)

Majority of our cases belonged to Lahore city and its suburbs, a population of 12.5 million people. Overcrowding is an important risk factor for spread of all types of droplet infections. Asma Mushtaq et al described 60% measles cases from urban Lahore in 2012.⁽²⁰⁾ Koenig et al in Bangladesh found that patients living in a house of <18.6 m² had 2.6 times higher mortality risk than those living in houses of >3.7 m².⁽²⁵⁾ No such relation however was confirmed in USA.⁽²⁶⁾

Many of our patients belonged to same families. Some of the parents admitted their children only after death of a sibling. Aaby P et al and Burstrom B et al in their West African and European studies have shown that children

developing measles after an in-house contact have higher mortality rates than those exposed to contacts outside their house. This probably is linked to higher inoculum from more intimate and prolonged exposure compared with limited exposures outside home.^(27, 28)

Pneumonia, Diarrhea, laryngitis and encephalitis were most common complications observed in our case series. The high proportion of respiratory complications (80.7%) is in accordance with another study from Lahore (2012) noting 93% measles cases with pneumonia.⁽²⁰⁾ This is in sharp contrast to previous observation of pneumonia in 5% children developing measles.⁽²⁹⁾ Pneumonia was also most common complication observed in children who died (83.6%). (p-value<.05) The review of literature also mentions Pneumonia as the most common severe complication of measles and accounts for most measles-associated deaths.⁽³⁰⁾

Thirty seven percent of our patients developed measles related diarrhea. Feachem & Koblinsky in a community based study from developing countries found diarrhea complicating measles in 15%—63% cases. This however was before advent of vaccines.⁽³¹⁾ A recent study from interior Sindh reported diarrhea in 19.2 % cases only.⁽³²⁾ Variable incidence of measles related diarrhea is being reported from other Pakistani cities.^(20, 21) Improved rehydration strategies have rendered measles related diarrhea mortality as statistically insignificant (p-value>.05).

Measles encephalitis presents as abrupt onset fits, altered state of consciousness and multifocal neurological signs.⁽³³⁾ The reported incidence is 13 per 1000 measles cases; affecting children mostly in age group > 5 years, adolescents and in old ages. Recent studies describe its incidence ranging from 0.1%, 2.2% and 21.7% while it was 7.7% in our study.^(21, 32, 34) It was another statistically significant risk factor for mortality in our case series (p-value<.05).

Conjunctivitis and keratitis are common ocular complications. They heal uneventfully in most well-nourished children. Secondary bacterial and viral (*Pseudomonas* or *Staphylococcus*, HSV or adenovirus) can lead to permanent scarring and blindness.⁽³⁵⁾ Vitamin A deficiency predisposes to more severe corneal inflammation, scarring, and blindness.⁽³⁶⁾ Measles associated with vitamin A

deficiency is one of the most common causes of acquired blindness in children in developing countries.⁽³⁷⁾ We came across only one case of corneal scarring.

The socioeconomic factor like poverty is another major risk factor related to high morbidity and mortality. The percentage of Pakistani population living below international poverty line of US\$1.25 per day is on the rise.⁽³⁸⁾

Breast feeding is best feeding and gold standard of preventing malnutrition in a society. The ratio of exclusive breast feeding is directly linked to infant mortality rate. The current IMR and exclusive breast feeding rates in Pakistan are 59 and 37% respectively.⁽³⁸⁾ Unfortunately poverty and breast feeding were not considered in our study.

CONCLUSION:

The study of hospitalized cases of measles points towards a much larger spread of disease in the community (iceberg tip phenomenon). In a susceptible population with malnourished children and low vitamin A coverage, the routine EPI coverage should not be allowed to fall below 90%, otherwise such epidemics may happen again in future. There is ever present need to strengthen vaccination services in large public interest.

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