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# Morbidity Pattern and the Management Outcome of Triaging Children Attending Pediatric Emergency Services of a Tertiary Care Hospital, South India

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***Abstract:*** *Paediatric emergency service plays a prime important role in saving paediatric lives. In India, around 1.7 million children died before reaching the age of 5 years in 2010. Appropriate and timely management of children in paediatric triages can significantly reduce the mortality and morbidity. The knowledge on triaging helps in designing protocols. A descriptive study was undertaken to assess the morbidity pattern and the management outcome of triaging children attending paediatric Emergency Services (PES) of a tertiary care Hospital, South India. Systematic sampling technique was undertaken and a sample size of 600 triage assessments were included. Instruments such as demographic profile, clinical profile and management outcome of the triaging were used. Demographic variables indicated that among the children brought to casualty 10% of children were newborns, 22% were infants, and 38% of the total visits were less than three years of age. Also 10% of the study subjects were adolescents which projects the need to equip the unit with adult equipment. The study showed that, 26% of total visits were related to respiratory illness and 21% had gastro intestinal infections. Physiological status of children at the time of arrival showed that, 37% of children reported with fever, 15% of the children had respiratory distress, and 3% presented with gasping. The outcome of triaging revealed that, 242 (41%) children in PES were admitted in the wards, 36 (6%) were shifted to paediatric intensive care unit and 26 (5%) to paediatric high dependency unit. About 289 (48%) children were discharged with medical advice which alerts the protocol and policy makers to facilitate the PES with a nurse educator who can spend time in educating children and their parents. Present study found that triaging done by the nurses were effective. Assessment of the morbidity patterns and the management outcome of children in PES will therefore help the health professionals to be prepared to meet the needs of children brought to the PES.*

***Keywords:*** *morbidity pattern, management outcome, triage, children*

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## I. Introduction

Paediatric Emergency Service (PES) in a tertiary care hospital, South India is a specialized unit with 28,000 registrations annually which meets the unique needs of children during emergency. Under-five children are the most vulnerable group who are often challenged by emergency health conditions. Emergency care for the paediatric population remains a challenge because of the varying physiological and developmental stages in children. A description of the pattern and outcome of its admissions and factors that may contribute to their outcome will help proffer solutions in health care planning with regards to emergency care[1]. Children with varying disease conditions and acuity of illnesses, who seek emergency care require skilled and timely assessments by experienced emergency care providers.

In India, around 1.7 million children died before reaching the age of 5 years in 2010, and more than half of them (52%) died in the first month of life. The major causes of deaths were pneumonia (24%), prematurity (20%) and diarrhoea (13%). In Nigeria, around 700, 000 children died before their fifth birthday, 60 % of these deaths were due to the following conditions: malaria (20%), pneumonia (17%), prematurity (12%) and diarrhoea (11%) [2].

PES is the first point of contact for children who need urgent medical care before they are discharged home or sent to the ward for completion of treatment. Okoronkwo and Chappjumbo [3] explained that, in order to improve the quality of prompt child care a regular appraisal of the morbidity and mortality pattern at the emergency units is important. Carrying out such studies in emergency units will not only assess preparedness for prompt quality care, this knowledge will also help in designing protocols for the proper management of the common ailments presenting in PES and provide health education and advocacy by health personnel. Findings of this study can build policy decisions on resource and manpower allocations as well as preventive measures to reduce morbidity and mortality from childhood diseases.

Infections and communicable diseases have remained top causes of childhood morbidity and mortality in under five population[2]. The knowledge of morbidity pattern and outcome in PES helps in evaluating and improving the existing facilities[4]. There has been no such study in this tertiary hospital. Therefore, the investigator was interested to measure the morbidity pattern in PES which will identify the pattern of triaging, and child's outcome that helps to appraise the facilities on the ground and provide data for re-evaluation to assess the need for sustenance of triage nursing. The objectives of this study were to assess the morbidity pattern of children attending PES, assess the triaging pattern in PES, and assess the child's management outcome in PES.

## II. Methodology

**Design and Sampling**

A descriptive research design was adopted to assess the morbidity pattern, pattern of triaging and outcome of triaging. This study was conducted in Paediatric Emergency Service of Christian Medical College. CMC is a tertiary care centre with multiple specialties. This is a 2700 bedded hospital. PES is located at the ground floor which has twenty one beds. PES is challenged to cater to children from 0-15 years of age with varied complex clinical conditions except for paediatric trauma. The registration number has escalated more than twenty eight thousands annually, the registration from June – August was 16,673, in which 18 children revisited PES within 72 hours after discharge and 11 deaths occurred. PES runs twenty four hours basis with Paediatric consultants, Casualty Medical Officers (CMO), Residents, Paediatric Emergency Nurses and supportive staff. Any child with acute medical and surgical problem were managed with appropriate emergency treatment till they shifted to inpatient facility. This study was undertaken for three months from June to August 2017. Samples were collected using Systematic sampling technique. Sample size was calculated to six hundred triage assessments by a statistical expert.

**Instruments**

A triage assessment check list was used to collect data for the study. The content validity was established by medical and nursing research experts The Content Validity Index (CVI) was 0.84. The check list had the following sections.

**Section I**: **Demographic variables of the child:** It includes age, sex, religion, education, ordinal position in the family, location of residence, previous visit to PES (visit within 72 hours).

**Section II: Clinical variables:** It included type of visits , onset of the presenting illness, system involved, time of arrival to causality, Temperature, respiratory status, GCS, SPO2, heart rate, and priority given in triage area.

**Section III: Management outcome:** It included time taken to be seen by the Casualty Medical Officer (CMO), any changes in the level of priority by CMO, emergency management given like oxygen started b) IV access initiated, c) resuscitated d) intubated e) inotropes f) antibiotics ordered, g) antibiotic given, time of administration of first dose of antibiotic, and child's status.

**Data collection procedure**

Data were collected over a period of three months from June to August 2017. Tools used for the data collection were demographic variable proforma of the Child, Clinical Variable and the management outcome of the triaging developed and validated by the nursing and medical experts. Every alternate day, the investigator collected the hospital number of the triaged children from the triage register. Of the total triaging twenty triaged records were selected for assessment by using systematic sampling technique by choosing every fifth triage record. Data such as the demographic and clinical details were collected from the chart and other needed data were collected from the parents. Collected data were entered and analyzed in epidata using descriptive and inferential statistics based on the objectives of the study. The study was performed after getting approval from the institution review board and ethics committee. Permission was obtained from the Heads of the medical and

nursing. An informed consent was obtained from the parents. Confidentiality of the information was achieved by maintaining anonymity of the subjects.

## III. Results And Discussion

Demographic variables of the child indicated that, among the children brought to PES, 10% of children were newborns, 22% were infants. Also 38% of the total visits were less than three years of age. In a similar study conducted by Salaria and Singhi (2003)[5] the results showed that about half (52.5%) of all the total patients were under the age of one 22.1% were between 6-12 years. Findings from this study alert the unit to develop a comprehensive and intermittent assessment to prevent children deteriorating. Findings also recommended a quick and appropriate emergency management. Also 10% of the study subjects were adolescents between 13 to 17 years of age which insists the need to equip the unit with adult equipment. The study revealed that 62% of the study participants were males and 38% were females.

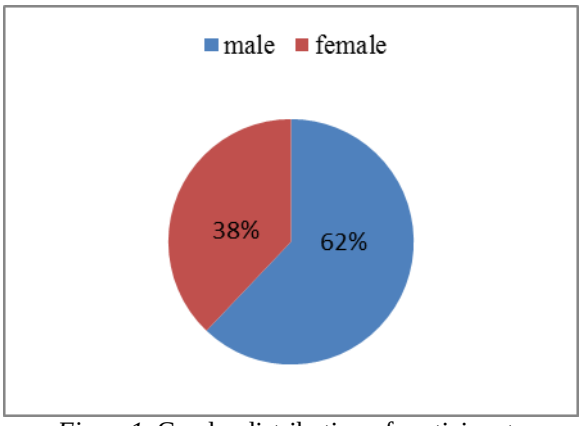


*Figure1*. Gender distribution of participants

Figure one showed that visits of male children more compare to female children. Anyanwu, Ezeanosike, and Ezeonu[6] found in their study that males (58.8%) were more compared to females (42.2%). Even many studies in developing countries like India showed males were given more importance than females. Majority 475 (79%) children in the present study belonged to Hindu by religion and 368 (61%) children had not started their schooling.

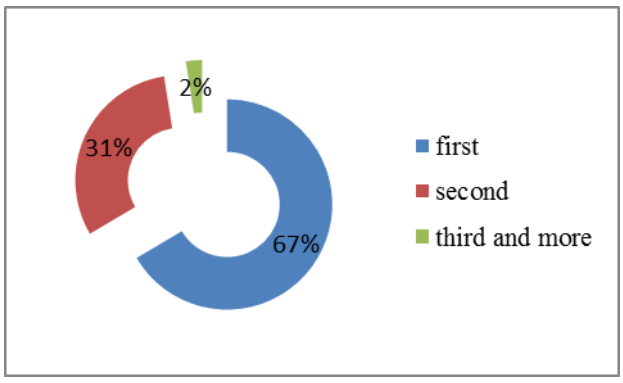


***Figure 2.*** Distribution of children depending on the ordinal position in the family

Figure two showed that majority of the participants were first born children. Majority 399 (67%) of the study participant's ordinal position was first in the family and only 15 (3%) of the samples were the third in order. Study revealed that 332 (55%) of children were from rural areas. Of the total subjects 358 (59.67%) visited paediatric emergency services for the first time. Only 48 (8%) of children revisited paediatric emergency service within 72 hours, PES registration from May to August 2017, showed out of 16,673 only 18 children revisited within 72 hours to PES. Majority 572 (96%) of children were brought to PES by their parent's rest 26 (4%) only were brought by their grandparents.

Clinical variables of children attending PES revealed that 174 (29% ) of children were referred from other health facilities where as426 ( 71%) of children visited PES directly as their first source of health care facilities. Within this health facility, about 16 (3%) of children registered and referred from child Heath OPD

where as 581 (97%) of children directly registered in PES. Mostly 252 (42%) of the children visited within 24 hours of onset of illness and interestingly study revealed that, about 201 ( 33%) of children visited with chronic problem, with one week to one month onset of illness. The study showed that, 158 (26%) of total visits were related to respiratory illness out of which 84 (27.27% ) children were triaged as priority one, out of 127 (21%) children with gastro intestinal infections 56 (18.18% ) were triaged as priority one, (see figure 1). In a similar study by Singhi, Gupta, & Jain[7] they identified that diarrhoea and respiratory infections as common morbidities.

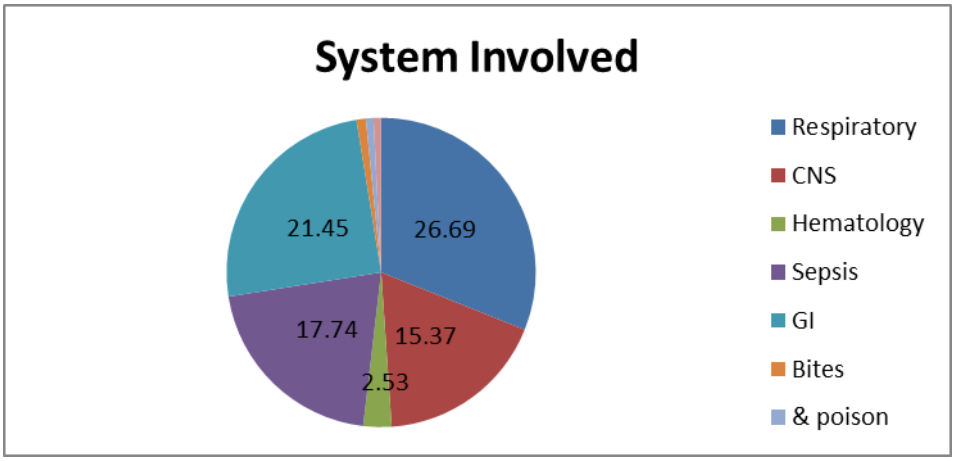


**Figure 3:** Distribution of the child's visit to PES as per system involved

Figure 3 revealed that, Respiratory and Gastro intestinal (GI) are the common causes for PES visits. Other common visits were with sepsis 104 (17.63%) in which 31 (10.06%) required priority one treatment, Central Nervous system infections visits were 91 (15.42%) in which 31 (20.45%) received priority one management, other problems which included renal, allergy reactions bleeding and Stings and bites (shown in Table 1).

**Table 1** Distribution of Child's Visits to PES as per System and Priority Level

| System Involved | Priority one No & % | Priority Two No & % | Priority three No & % | Total No & % | $X^2$ | P. Value |
|---|---|---|---|---|---|---|
| Respiratory | 84<br>22.27 | 53<br>24.54 | 21<br>31.82 | 158<br>26.78 | 59.6774 | 0.0000 |
| CNS | 63<br>20.45 | 23<br>10.65 | 5<br>7.58 | 91<br>15.42 | | |
| Hematology | 11<br>3.57 | 2<br>0.93 | 2<br>3.03 | 15<br>2.54 | | |
| Sepsis | 31<br>10.06 | 60<br>27.78 | 13<br>19.70 | 104<br>17.63 | | |
| Gastro Intestinal | 56<br>18.18 | 49<br>22.69 | 21<br>31.82 | 126<br>21.36 | | |
| Bites | 5<br>1.62 | 0<br>0.00 | 0<br>0.00 | 5<br>0.85 | | |
| Stings and poisoning | 4<br>1.30 | 0<br>00 | 0<br>00 | 4<br>0.68 | | |
| CVS | 4<br>1.30 | 0<br>00 | 0<br>00 | 4<br>0.68 | | |
| Fever (PUO) | 3<br>0.97 | 1<br>0.46 | 0<br>00 | 4<br>0.68 | | |
| Others | 47<br>15.26 | 28<br>12.96 | 4<br>6.06 | 79<br>13.39 | | |

Table one showed that children visited with respiratory and GI system received priority one level attention. In a study conducted by Ibeziako and Ibekwe[8] on pattern and outcome of admissions in the children's emergency room of the University of Nigeria teaching hospital, the commonest causes of admission in PES were febrile convulsions (21.5%), severe malaria with anaemic heart failure (18.4%), acute lower respiratory tract infections in 16.1%, diarrhoeal diseases (12.3 %), complications of sickle cell anaemia (7.6%), acute neurological conditions (7.6%), acute asthma (5.2%) and neonatal conditions (4.8 %). Surgical emergencies constituted 6.1 % of all admissions while chronic medical conditions were only 0.4 %.

Physiological status of children at the time of arrival showed that, 217 (37%) of children reported with fever, 67 (11.2%) of the children had respiratory distress, and 14 (3%) presented with gasping, 23 (3.83%) with cold extremities, and 14 (3%) with dehydration. About 6 (1%) children were cyanosed at the time of arrival and 2 (0.34%) children had a signs of jaundice. Among 600 children visited PES, 313 (52.34%) children were

triaged as priority one and 216 (36.12 %) were in two, only 69 (11.54 %) were in priority three, which indicated that, most of the children were critical when received in PES (Shown in Figure 4).

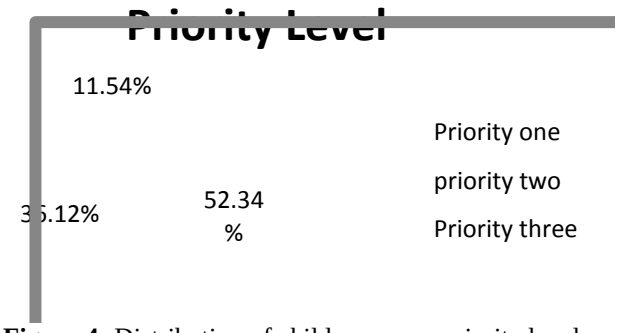


**Figure 4:** Distribution of children as per priority level

Figure 4 showed that, majority 52.34 % of children were prioritized as priority one and very less in priority three 11.54%. One of the quality indicators in triage is waiting time limits. As per current protocol, children in priority one should receive medical attention within five minutes, priority two within thirty minutes and priority three within one hour. Present study found that 231 (71.96%) children in priority one received medical attention less than three minutes. All the study participants in priority one 321 (100%) were seen within five minutes of arrival. Children in priority two 87 (44%) were seen within 30 minutes of arrival. Children in priority three 48 (56%) were seen within thirty minutes and remaining 37 (38%) children were seen between 1-2 hours. Majority 586 (98%) of the triage score (priority level) was same as done by the nurses and not changed by the causality medical officers. It was also found that, 320 (54%) children received emergency management in PES. As the immediate management 103 (17 %) were started on oxygen, 297 (52%) an intravenous line was started for blood samples and for fluid management, in about 23 (3.83%) children cardio pulmonary resuscitation was initiated, and 19 ( 3%) were intubated in PES. Present study also revealed that 21 (3%) of the children were started on ionotropes. Regarding antibiotic administration 235 (39 %) children were ordered and given antibiotic therapy in which 60 (25%) children received antibiotics within thirty minutes, 46 (20%) within one hour and 131 (55%) received between one to two hours.

The outcome of triaging revealed that, 242 (41%) children in PES were admitted in the wards, 36 (6%) were shifted to paediatric intensive care unit and 26 (5%) to paediatric high dependency unit. About 6 (0.84%) children left against medical advice and no death has been recorded. 289 (48%) children were discharged after the necessary treatment with medical advice explaining about the danger / warning signs and with the advice to visit PES when symptom persists or worsening. This alerts the protocol and policy makers to facilitate with a nurse educator in emergency unit, who can spend time in educating children and their parents about the early warning signs and warn when to seek for emergency help.

Study also revealed that, children in priority one 21 (6.71%) needed cardio pulmonary resuscitation . Sixteen (5.11%), children were intubated and 18 (5.75%), in priority one and two in priority two were (0.93%) given ionotropic drugs. In priority one, 92 children (29.39%) were started on oxygen therapy, 7 (3.24%) in priority two and 3 (4.35%) in priority three also needed oxygen therapy. None from priority three needed CPR or ionotropic support. In contrast 236 (75.4%) children in priority one and 66 (30.56%) in priority two and 4 (5.8%) in priority three needed intravenous fluid therapy. Majority of the children from priority one were admitted in the ward 181 (58.01%) , ICU 30 (9.62%) and 74 (23.72%) were discharged. Study also highlighted that, 4 (1.85%) in priority two and one (1.47%) priority three needed PICU admission ,one (0.46%) required resuscitation and one (0.46%) was intubated from priority two group. This alerts the unit policy makers to develop a monitoring system to monitor priority two and three population to recognize and promptly pickup these children as children deteriates fast in their clinical conditions.

Investigator was also interested to identify the association between the priority levels and the management outcomes that were measured. It showed that there were significant association in all the management outcome which is shown in the below table.

**Table 2 :** Association between priority level and Physiological status of children.

| Fever | Priority One % | Priority Two % | Priority Three % | Total % | $X^2$ | P Value |
|---|---|---|---|---|---|---|
| Yes | 37.22 | 40.65 | 20.59 | 36.55 | | |
| No | 62.78 | 59.35 | 78.41 | 63.45 | 9.0843 | 0.011 |
| GGS Level | | | | | | |
| <= 8 | 4.15 | 0.46 | 1.45 | 2.51 | | |
| 9 - 14 | 5.75 | 0.46 | 0.00 | 3.18 | | |
| 15 | 90.10 | 99.07 | 98.55 | 94.31 | 22.2540 | 0.000 |
| SPO2 | | | | | | |
| < =94 | 11.18 | 1.39 | 1.45 | 6.52 | | |
| >=95 | 88.82 | 98.61 | 98.55 | 93.55 | 23.3977 | 0.000 |
| Heart Rate | | | | | | |
| Normal | 69.01 | 75.93 | 84.06 | 73.24 | | |
| Abnormal | 30.99 | 24.07 | 15.94 | 26.76 | 7.7740 | 0.021 |

Table 2 revealed that, There was a significant association between priority level and physiological status of children.

Table 3
Association between priority level and Emergency Management given in PES

| Oxygen started | Priority one | Priority two | Priority three | Total | $X^2$ | P Value |
|---|---|---|---|---|---|---|
| No | 70.61 | 96.76 | 95.65 | 82.94 | | |
| Yes | 29.39 | 3.24 | 4.35 | 17.06 | 70.6897 | 0.000 |
| IV Access initiated | | | | | | |
| No | 24.60 | 69.44 | 94.20 | 48.83 | | |
| Yes | 75.40 | 30.56 | 5.80 | 51.17 | 167.1280 | 0.000 |
| Resuscitated | | | | | | |
| No | 93.29 | 99.54 | 100 | 96.32 | | |
| Yes | 6.71 | 0.46 | 0.00 | 3.68 | 17.0508 | 0.000 |
| Intubated | | | | | | |
| No | 94.89 | 99.54 | 100 | 97.16 | | |
| Yes | 5.11 | 0.46 | 0.00 | 2.84 | 12.2826 | 0.002 |
| Ionotropes used | | | | | | |
| No | 94.25 | 99.07 | 100 | 96.66 | | |
| Yes | 5.75 | 0.93 | 0.00 | 3.34 | 11.9026 | 0.003 |
| Antibiotics Given | | | | | | |
| No | 46.96 | 69.44 | 92.75 | 60.37 | | |
| Yes | 53.04 | 30.56 | 7.25 | 39.63 | 61.1878 | 0.000 |
| First dose of Antibiotics given | | | | | | |
| Within half an hour | 27.71 | 20.00 | 0.00 | 25.00 | | |
| Half – one hour | 22.29 | 13.85 | 0.00 | 19.49 | | |
| More than One hour | 50.00 | 66.15 | 100 | 55.51 | 9.1094 | 0.058 |

Table three showed that, there was a significant association between priority level and the emergent Management given in PES.

## IV. Conclusion

Children attended PES mostly for acute medical conditions. A significant proportion of visits in PES were true emergencies. The study emphasized that, as adolescents also seek PES for emergency treatment, emergency unit need to be ready with equipment and protocols for addressing their needs. Study also revealed that, triaging performed by nurses were effective. The other important finding was a significant proportion (48%) of pediatric population were discharge after the necessary treatment with medical advice about the danger/ warning signs and the need to visit PES when symptom persists or worsens. This alerts the protocol and policy makers to facilitate with a nurse educator in emergency unit, who can spend time in educating children and their parents about the early warning signs and when to seek for emergency help. Study also highlighted that, 4 (1.85%) in priority two and one (1.47%) in priority three needed PICU admission, one (0.46%) required resuscitation and one (0.46%) was intubated from priority two group. This alerts the unit policy makers to develop a monitoring system to monitor priority two and three population to promptly pickup these children as they deteriorate from their clinical conditions. It was noted that there is a need for evaluating the hydration status and modifying the priority based on hydration warrants further exploration.

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