

DEVELOPMENT AND VALIDATION OF SOFTWARE TOOL FOR TRIAGE OF PREGNANT WOMEN
IN EMERGENCY WARD AT A TERTIARY CARE CENTRE

INTRODUCTION

- The process of triaging a pregnant woman is extremely important as the prolonged waiting time may adversely affect maternal and perinatal outcomes. This concept has shifted the focus of obstetric care to include obstetric triage (OT) units.
- Various studies have shown that reduced waiting at the emergency department actually reduces the duration of stay in hospital, treatment cost and saves hospital resources; This highlights the importance of appropriate utilization of triaging services, especially in Obstetrics.
- The benefit of triaging is affected in hospitals with a large turnover of patients and reduced manpower at each shift when healthcare workers do it.
- In places where the health care workers are getting shifted across the health departments within the facility, periodic training and reinforcement will become difficult.
- This results in inadequate triaging and poor quality of care at ED. Therefore to address this issue and improve the quality of care we intend to develop a user friendly symptoms based software tool and its use in real setting.

AIMS AND OBJECTIVES

At tertiary care centre,

- a. To develop and validate a software tool for triaging pregnant women attending obstetric emergency ward
- b. To assess the performance of the developed software tool by deploying it in real setting

OBSERVATIONS AND RESULTS

- A total of 2876 obstetric patients attended emergency department of our hospital during the study period. Their distribution of different categories of triage of pregnant patients during the study period is given in (Fig 1).
- The two most common diagnosis were primigravida in labour and premature rupture of membrane (PROM) in the emergency ward before and after app triage.
- Validation of the app was done as described in methodology and had 95%acuuracy and was found to be valid for the population. (Table 1) shows the details of app validation
- It was found that there was a significant reduction in the waiting time of patients after the installation of the triage app
- The total time of the patient spent in the emergency ward remained unchanged even though here was a reduction in waiting time.
- The change in the waiting time for each category and comparison of the time spend by patients in emergeny ward is depicted in (table 2)
- The waiting time of the patients had decreased by **57.23%** in total. While examining individual category there is **82.77%** decrease in red category, 65.88% in Yellow and **45.42%** in green.

METHODOLOGY

- **Study population** – All pregnant women attending Obstetric emergency ward at Women and Children Block (WCB) at JIPMER Puducherry
- **Sampling technique:** Non purposive sampling
- **Sample size-** 29 in each category which is 87 (for three colour coded triage) before and after app (Pre & Post implementation) that will be total of 174.
- **Study duration-** 2 months
- During first month
 - Development of app
 - Pre-implementation data
- During second month
- Post-implementation data
- **Inclusion criteria:**•Pregnant women attending emergency department at WCB, JIPMER
- Age > 18 years

Step 1

- Software was developed based on the existing color coded triage system used in the institute(**table 3**)
- The accuracy of the developed software was assessed by percentage of agreement between the software and independent health care workers (medical graduate obstetric emergency ward

Step 2

- Software was installed in the computers of labor room, emergency ward and ICU.
- Patients were triaged in the emergency ward using the app, which was monitored through all the computers in which app was installed

Step 3

- Waiting time (Difference between the time of entry to emergency and first attended by doctors) for each patients and time taken for disposal / admission from the time of first consultation was noted.
- All these data for each category was compared with the baseline data which was collected before installation of app.

Table 2:Comparison of waiting time and decision (disposal) time during triage before and after the app

Triage	Waiting Time Before App	Waiting Time After App	Reduction in Time	Percentage of Reduction
Red	325 Min	56 Min	269 Min	82.77%
Yellow	932 Min	318 Min	614 Min	65.88%
Green	1385 Min	756 Min	629 Min	45.42%
Total Waiting Time	2642 Min	1130 Min	1512 Min	57.23%

Table 1:Details of precision analysis for the developed App

Class	Red	Yellow	Green
n (truth)	6	7	7
n (classified)	7	6	7
Accuracy	95%	95%	100%
Precision	0.86	1	1
Recall	1	0.86	1
F1 Score	0.92	0.92	1



SCAN FOR DETAILS

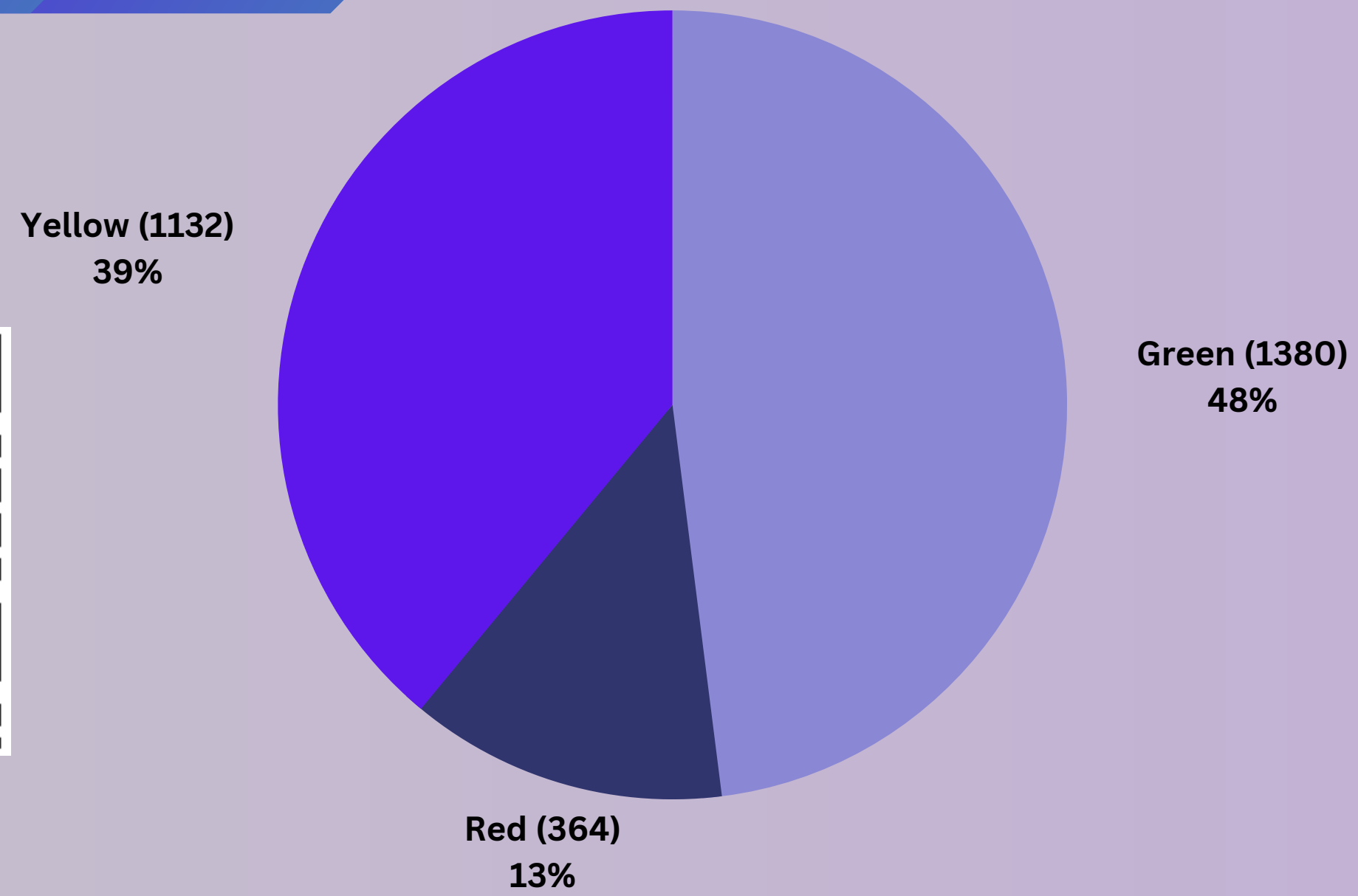


Figure No. 1 : Frequency Triage Distribution

Table 3:Three Color Coded Triage

RED (for immediate attention)	YELLOW(within 20 minutes)	GREEN(within 1 hour)
1. Patient on hand ventilation/laboured breathing 2. H/O convulsion /loss of consciousness/unconscious /altered sensorium 3. Bleeding p/v(antenatal/postnatal) 4. Operated outside and bought in shock 5. H/O imminent symptoms/referred as Eclampsia or imminent Eclampsia 6. Referred as ruptured ectopic/ruptured uterus 7. Vitals : a. Heart rate> 120 /min b. Systolic BP > 160mmHg diastolicBP>110mmHg c. Respiratory> rate 30/min	1. Imminent delivery/delivered outside 2. Referred as CPD in labor /obstructed labor from outside 3. Suspected cord prolapse 4. H/O leaking P/V 5. Loss of fetal movement/decreased fetal movement 6. Referred as unruptured ectopic and vitals stable 7. Previous LSCS in labor 8. Multiple pregnancy in labor 9. Preterm labor 10. Retention of urine 11. Referred from another hospital	1. Past dates 2. Referred asoligoamnios / IUGR / anomalous foetus 3. IUD(not in labor, shock, fever) 4. Uncomplicated patients with mild labor pains only 5. UTI, fever 6. AUB with stable vitals 7. General gynaecological complaints-pain abdomen mass abdomen / malignancy, dysuria 8. Cross reference(not immediate type 9. Came for second opinion or

DISCUSSION

The developed triage App was found to be valid with good kappa and F1 score. In real time scenario, it had reduced the waiting time for initial assessment at Obstetric ED. However the total time taken to admit the patient has not shown significant improvement after the App. This depended upon various factors like availability of bed and urgency of clinical condition. The external validation of developed App can be tested in other settings in future. It can be incorporated on to electronic medical records.

CONCLUSION

The App developed for triaging Obstetric patients at tertiary care centre was found to be valid and it reduced the waiting time significantly in real setting.