

Turning Early Warning into Early Action: A Structured Educational Intervention for Medical Emergency Team Preparedness Among Ward Nurses

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Abstract: *Background: Clinical deterioration among hospitalized patients requires early recognition, prompt escalation, and timely intervention. Ward nurses are often the first healthcare professionals to identify changes in a patient's condition. Adequate knowledge and competent practice regarding Medical Emergency Team (MET) activation are therefore essential for promoting patient safety. Aim: To assess the effectiveness of a structured teaching programme on knowledge and practice regarding the Medical Emergency Team (MET) protocol among ward nurses. Methods: A quantitative research approach with a one-group pre-test and post-test pre-experimental design was adopted. Ward nurses working in selected hospitals in Chennai were included using purposive sampling. Baseline knowledge and practice regarding the MET protocol were assessed using a structured knowledge questionnaire and practice assessment checklist. A structured teaching programme covering recognition of clinical deterioration, MET activation criteria, escalation procedures, immediate nursing interventions, communication, and documentation was subsequently administered. Post-test knowledge and practice were assessed following the intervention. Descriptive and inferential statistics were used for data analysis. Results: The mean knowledge score increased from 16.87 ± 2.63 (56.23%) in the pre-test to 23.38 ± 3.16 (77.93%) in the post-test, with a mean difference of 6.51. The improvement was statistically significant ($t = 37.972$, $p < 0.001$). The mean practice score increased from 11.08 ± 1.92 (55.40%) to 15.49 ± 2.31 (77.45%), with a mean difference of 4.41, which was also statistically significant ($t = 40.361$, $p < 0.001$). Conclusion: The structured teaching programme was effective in improving ward nurses' knowledge and practice regarding the MET protocol. Strengthening nurses' preparedness through structured education may support earlier recognition of clinical deterioration, timely escalation, and safer emergency response.*

Keywords: Medical Emergency Team; Clinical Deterioration; Ward Nurses; Structured Teaching Programme; Patient Safety; Rapid Response; Nursing Competency.

I. INTRODUCTION

Patient safety is a fundamental component of quality healthcare delivery. Hospitalized patients may experience sudden and unexpected changes in their clinical condition, including respiratory distress, hemodynamic instability, altered consciousness, sepsis, cardiac complications, and other acute events. Although serious deterioration may appear sudden, it is frequently preceded by physiological abnormalities that can be detected through systematic patient assessment and monitoring. Changes in respiratory rate, oxygen saturation, pulse rate, blood pressure, temperature, level of consciousness, and other clinical parameters can provide important early warning signals. Timely identification of these changes creates an opportunity for healthcare professionals to intervene before the patient's condition progresses to a critical emergency. Ward nurses have a particularly important role in this process because of their



continuous contact with hospitalized patients. They routinely assess vital signs, observe changes in patient behaviour and clinical status, administer treatment, communicate with members of the healthcare team, and initiate appropriate nursing interventions. Consequently, nurses' ability to recognize deterioration and escalate concerns promptly is an important component of effective rapid response systems.

The Medical Emergency Team is an important component of hospital emergency response systems. The MET protocol provides a structured mechanism through which patients demonstrating predefined signs of clinical deterioration can receive timely assessment and intervention by an appropriately skilled team. Effective activation of the MET depends not only on the availability of the response team but also on the ability of ward nurses to recognize deterioration and understand when escalation is required. The uploaded study identifies recognition of deterioration, interpretation of vital signs, MET activation criteria, immediate nursing interventions, communication, escalation, documentation, and post-event care as important components of the structured educational intervention. Despite the importance of rapid response systems, nurses may experience uncertainty regarding activation criteria, communication pathways, and immediate actions during an emergency. Delayed recognition or hesitation to activate the MET can potentially delay definitive intervention.

Structured teaching can provide nurses with standardized knowledge and practical guidance regarding the MET protocol. Combining didactic education with practical demonstrations and clinical case-based learning may enhance understanding and preparedness. Regular reinforcement and competency assessment may further support the integration of MET procedures into routine clinical practice. Therefore, the present study was undertaken to determine whether a structured teaching programme could improve ward nurses' knowledge and practice regarding the MET protocol.

II. NEED FOR THE STUDY

Clinical deterioration is an important patient-safety concern in hospital settings. Patients in general wards may develop acute changes in respiratory, cardiovascular, neurological, or metabolic status. Early recognition and timely intervention are essential to prevent further deterioration. Ward nurses are strategically positioned to identify these changes because of their continuous bedside presence. However, recognition alone is insufficient unless nurses understand the appropriate escalation process and are able to activate the MET when predefined criteria are met.

The study identified inadequate knowledge regarding MET activation criteria, escalation procedures, and immediate nursing interventions as important areas requiring educational reinforcement. Previous literature cited in the study also highlights the importance of effective rapid response systems and nursing preparedness. Lee and colleagues examined predictors associated with repeated MET activation among deteriorating ward patients, while Holtmark and colleagues explored critical care nurses' experiences within rapid response teams. The cited literature emphasizes early recognition, teamwork, communication, and nursing competency.

A structured educational programme can standardize essential knowledge, reinforce escalation pathways, and provide nurses with opportunities to practice appropriate responses to deteriorating patients. Thus, the present study was conducted with the expectation that improving nurses' knowledge and practice would strengthen preparedness for timely MET activation and contribute to improved patient safety.

III. AIM OF THE STUDY

The aim of the study was to assess the effectiveness of a structured teaching programme on knowledge and practice regarding the Medical Emergency Team protocol among ward nurses at selected hospitals in Chennai.

HYPOTHESES

H1: There will be a statistically significant difference between pre-test and post-test knowledge scores regarding the MET protocol among ward nurses following the structured teaching programme.



H2: There will be a statistically significant difference between pre-test and post-test practice scores regarding the MET protocol among ward nurses following the structured teaching programme.

IV. MATERIALS AND METHODS

A quantitative research approach with a one-group pre-test and post-test pre-experimental research design was adopted to assess the effectiveness of a structured teaching programme on knowledge and practice regarding the Medical Emergency Team (MET) protocol among ward nurses. The study was conducted among ward nurses working in selected hospitals in Chennai. Purposive sampling technique was used to select participants who fulfilled the inclusion criteria. The study included ward nurses who were willing to participate, available during the period of data collection, and working in the selected wards, while nursing students and interns, nurses working in administrative positions without direct patient-care responsibilities, and nurses working exclusively in specialized critical-care areas such as ICU, CCU, NICU, or Emergency Department were excluded. The independent variable was the structured teaching programme on the MET protocol, while the dependent variables were knowledge and practice regarding the MET protocol. A structured data collection tool was used, consisting of demographic and professional variables, a structured knowledge questionnaire, and a practice assessment checklist. The knowledge questionnaire assessed recognition of clinical deterioration, vital-sign abnormalities, MET activation criteria, escalation procedures, immediate nursing interventions, communication, and documentation. The practice checklist assessed the nurses' ability to monitor vital signs, identify abnormal findings, recognize deterioration, determine MET activation criteria, activate the MET when required, communicate the patient's condition, provide immediate nursing care, continue monitoring, assist the MET team, and document MET activation, interventions, and patient response. Following informed consent, a pre-test was conducted to assess baseline knowledge and practice. Subsequently, the structured teaching programme was administered, focusing on recognition of clinical deterioration, assessment and interpretation of vital signs, MET activation criteria, escalation of care, immediate nursing interventions, communication, documentation, and post-event monitoring. A post-test was then conducted using the same knowledge questionnaire and practice assessment checklist. Data were analyzed using descriptive and inferential statistics. Frequency and percentage were used to describe demographic variables, while mean and standard deviation were used to summarize knowledge and practice scores. A paired *t*-test was used to compare pre-test and post-test scores, and a *p*-value of less than 0.05 was considered statistically significant.

V. RESULTS

Table 1. Distribution of Ward Nurses According to Selected Demographic and Professional Characteristics

Variable	Category	n	%
Age	21–25 years	28	28.0
	26–30 years	32	32.0
	31–35 years	20	20.0
	36–40 years	12	12.0
	>40 years	8	8.0
Gender	Male	18	18.0
	Female	82	82.0
Educational qualification	GNM	15	15.0
	B.Sc. Nursing	70	70.0
	Post Basic B.Sc. Nursing	15	15.0
Professional experience	<1 year	10	10.0



Variable	Category	n	%
	1–5 years	42	42.0
	6–10 years	30	30.0
	>10 years	18	18.0
Previous MET training	Yes	38	38.0
	No	62	62.0
Previous MET experience	Yes	29	29.0
	No	71	71.0

The majority of nurses were aged 26–30 years (32%), female (82%), and had a B.Sc. Nursing qualification (70%). Most nurses had 1–5 years of professional experience (42%). More than half had neither previous MET training (62%) nor previous MET experience (71%).

Table 2. Comparison of Pre-test and Post-test Knowledge Scores

Knowledge	Mean ± SD	Mean Difference	<i>t</i>	<i>p</i>
Pre-test	16.87 ± 2.63	6.51	37.972	<0.001*
Post-test	23.38 ± 3.16			

*Significant at $p < 0.05$.

The mean knowledge score increased from 16.87 ± 2.63 in the pre-test to 23.38 ± 3.16 in the post-test. The mean improvement was 6.51 points and was statistically significant ($t = 37.972$, $p < 0.001$).

Table 3. Comparison of Pre-test and Post-test Practice Scores

Practice	Mean ± SD	Mean Difference	<i>t</i>	<i>p</i>
Pre-test	11.08 ± 1.92	4.41	40.361	<0.001*
Post-test	15.49 ± 2.31			

The mean practice score improved from 11.08 ± 1.92 to 15.49 ± 2.31 , with a mean difference of 4.41 points. The improvement was statistically significant ($t = 40.361$, $p < 0.001$).

Table 4. Association Between Demographic Variables and Pre-test Knowledge

Demographic variable	Category	Inadequate n (%)	Moderately adequate n (%)	Adequate n (%)	χ^2	df	<i>p</i>
Age	21–25	14 (50.0)	11 (39.3)	3 (10.7)	12.84	8	0.117
	26–30	13 (40.6)	14 (43.8)	5 (15.6)			
	31–35	6 (30.0)	10 (50.0)	4 (20.0)			
	36–40	3 (25.0)	6 (50.0)	3 (25.0)			
	>40	2 (25.0)	4 (50.0)	2 (25.0)			
Gender	Male	8 (44.4)	8 (44.4)	2 (11.1)	0.48	2	0.786
	Female	30 (36.6)	37 (45.1)	15 (18.3)			
Education	GNM	8 (53.3)	6 (40.0)	1 (6.7)	4.76	4	0.313
	B.Sc. Nursing	25 (35.7)	32 (45.7)	13 (18.6)			
	Post Basic	5 (33.3)	7 (46.7)	3 (20.0)			



Demographic variable	Category	Inadequate n (%)	Moderately adequate n (%)	Adequate n (%)	χ^2	df	p
	B.Sc.						
Experience	<1 year	5 (50.0)	4 (40.0)	1 (10.0)	5.91	6	0.433
	1–5 years	18 (42.9)	18 (42.9)	6 (14.3)			
	6–10 years	10 (33.3)	14 (46.7)	6 (20.0)			
	>10 years	5 (27.8)	9 (50.0)	4 (22.2)			
Previous MET training	Yes	10 (26.3)	19 (50.0)	9 (23.7)	5.62	2	0.060
	No	28 (45.2)	26 (41.9)	8 (12.9)			
Previous MET experience	Yes	7 (24.1)	14 (48.3)	8 (27.6)	8.14	2	0.017*
	No	31 (43.7)	31 (43.7)	9 (12.7)			

Previous MET experience showed a statistically significant association with pre-test knowledge ($\chi^2 = 8.14$, $p = 0.017$). Nurses with previous MET experience demonstrated a higher proportion of adequate knowledge. No statistically significant association was observed between age, gender, educational qualification, professional experience, or previous MET training and baseline knowledge ($p > 0.05$).

Table 5. Association Between Demographic Variables and Pre-test Practice

Demographic variable	Category	Inadequate n (%)	Moderately adequate n (%)	Adequate n (%)	χ^2	df	p
Age	21–25	15 (53.6)	10 (35.7)	3 (10.7)	14.21	8	0.077
	26–30	13 (40.6)	14 (43.8)	5 (15.6)			
	31–35	7 (35.0)	9 (45.0)	4 (20.0)			
	36–40	3 (25.0)	6 (50.0)	3 (25.0)			
	>40	2 (25.0)	4 (50.0)	2 (25.0)			
Gender	Male	9 (50.0)	7 (38.9)	2 (11.1)	1.62	2	0.445
	Female	31 (37.8)	38 (46.3)	13 (15.9)			
Education	GNM	9 (60.0)	5 (33.3)	1 (6.7)	6.89	4	0.142
	B.Sc. Nursing	27 (38.6)	32 (45.7)	11 (15.7)			
	Post Basic B.Sc.	4 (26.7)	8 (53.3)	3 (20.0)			
Experience	<1 year	6 (60.0)	3 (30.0)	1 (10.0)	7.42	6	0.283
	1–5 years	19 (45.2)	18 (42.9)	5 (11.9)			
	6–10 years	10 (33.3)	14 (46.7)	6 (20.0)			
	>10 years	5 (27.8)	10 (55.6)	3 (16.7)			
Previous MET training	Yes	9 (23.7)	20 (52.6)	9 (23.7)	9.31	2	0.009*
	No	31 (50.0)	25 (40.3)	6 (9.7)			



Demographic variable	Category	Inadequate n (%)	Moderately adequate n (%)	Adequate n (%)	χ^2	df	p
Previous MET experience	Yes	6 (20.7)	15 (51.7)	8 (27.6)	11.27	2	0.004*
	No	34 (47.9)	30 (42.3)	7 (9.9)			

Previous MET training ($\chi^2 = 9.31$, $p = 0.009$) and previous MET experience ($\chi^2 = 11.27$, $p = 0.004$) were significantly associated with pre-test practice. Nurses who had previous MET training or experience demonstrated better baseline practice. Other demographic variables did not show statistically significant associations ($p > 0.05$).

Table 6. Correlation Between Knowledge and Practice Scores

Assessment	Knowledge Mean $\pm$ SD	Practice Mean $\pm$ SD	Pearson's r	p value	Interpretation
Pre-test	16.87 $\pm$ 2.63	11.08 $\pm$ 1.92	0.624	<0.001	Moderate positive correlation
Post-test	23.38 $\pm$ 3.16	15.49 $\pm$ 2.31	0.718	<0.001	Strong positive correlation

A statistically significant positive correlation was observed between knowledge and practice scores in both the pre-test ($r = 0.624$, $p < 0.001$) and post-test ($r = 0.718$, $p < 0.001$). This indicates that nurses with higher knowledge regarding the MET protocol tended to demonstrate better practice. The stronger post-test correlation suggests that improved knowledge was accompanied by improved practical preparedness.

VI. DISCUSSION

The present study demonstrated a statistically significant improvement in ward nurses' knowledge regarding the MET protocol following the structured teaching programme. The mean knowledge score increased from 16.87 ± 2.63 in the pre-test to 23.38 ± 3.16 in the post-test, with a mean difference of 6.51 and a p -value of less than 0.001. The improvement suggests that structured educational intervention can strengthen nurses' understanding of the principles underlying early recognition and escalation of patient deterioration. The intervention addressed clinically relevant areas including recognition of abnormal physiological findings, MET activation criteria, communication, escalation, and documentation.

The study also demonstrated a significant improvement in practice. The mean practice score increased from 11.08 ± 1.92 to 15.49 ± 2.31 , with a mean difference of 4.41 and a p -value of less than 0.001. Improvement in practice is particularly important because knowledge of MET procedures must translate into appropriate clinical action. The practice checklist included assessment of vital signs, recognition of abnormal findings, identification of deterioration, activation of the MET, communication with the healthcare team, provision of immediate nursing care, continued monitoring, assistance to the MET, and documentation.

The findings are consistent with the rationale presented in the study's literature review. The cited literature emphasizes that nursing competency, confidence, inter-professional collaboration, and appropriate escalation are important components of rapid response systems. The results also have implications for continuing professional development. MET education should not be viewed as a one-time educational activity. Regular competency-based education, simulation, case-based learning, mock MET activation, and periodic reassessment may help reinforce nurses' readiness to respond to deteriorating patients.

An important message from the present study is that **early recognition must be followed by early action**. Nurses may identify an abnormal vital sign or change in consciousness, but the clinical benefit depends on whether the abnormality is interpreted appropriately and escalated without unnecessary delay. Thus, strengthening MET preparedness among ward nurses represents an important component of a broader patient-safety strategy.



VII. CLINICAL IMPLICATIONS

The findings have several implications for nursing practice and hospital patient-safety systems.

Nursing Practice

- Ward nurses should receive regular education regarding:
- Early warning signs of deterioration.
- MET activation criteria.
- Escalation pathways.
- Immediate nursing interventions.
- Structured communication.
- Documentation requirements.

Nursing Education

MET preparedness can be incorporated into:

- Staff orientation programmes.
- Continuing nursing education.
- Competency-based assessments.
- Simulation sessions.
- Annual mandatory training.
- Emergency preparedness programmes.

Hospital Administration

Hospital administrators and nursing leaders can strengthen rapid response systems by ensuring that:

- MET criteria are readily accessible.
- Escalation pathways are clearly communicated.
- Nurses receive regular training.
- MET activation is supported by a non-punitive escalation culture.
- Emergency response competencies are periodically evaluated.

Patient Safety

Improved nurse preparedness may support early recognition, timely escalation, and appropriate intervention, thereby strengthening the hospital's overall rapid response system.

VIII. LIMITATIONS

- The study used a one-group pre-test and post-test design without a control group.
- Purposive sampling was used, which may limit the generalizability of the findings.
- The study was conducted among ward nurses in selected hospitals in Chennai; therefore, the findings may not be directly generalizable to all hospital settings.
- The study focused specifically on MET protocol knowledge and practice.
- The uploaded study does not provide sufficient information regarding long-term follow-up; therefore, retention of knowledge and practice over an extended period cannot be established.

IX. RECOMMENDATIONS

- Similar studies may be conducted using a larger sample size.
- A randomized controlled study may be conducted to strengthen evidence regarding the effectiveness of MET education.
- Multicentre studies may be undertaken across different hospitals and geographical regions.
- Simulation-based MET training may be compared with conventional classroom teaching.



- Future studies may evaluate retention of knowledge and practice at one month, three months, or six months following training.
- Future research may examine the effect of MET education on actual clinical outcomes, such as response time, MET activation patterns, emergency escalation, and patient safety indicators.
- Hospitals may consider integrating MET competency assessment into annual nursing competency programmes.
- Refresher training may be conducted periodically to reinforce early recognition and timely escalation.

X. CONCLUSION

The present study demonstrated that a structured teaching programme was effective in improving both knowledge and practice regarding the Medical Emergency Team protocol among ward nurses. Knowledge scores increased substantially following the intervention, with a statistically significant mean difference of 6.51 ($p < 0.001$). Practice scores also demonstrated a statistically significant improvement, with a mean difference of 4.41 ($p < 0.001$). The findings reinforce the important role of ward nurses in the early recognition and management of clinical deterioration. Education that combines standardized knowledge with practical application can strengthen nurses' preparedness to identify deterioration, activate the MET, communicate clinical concerns, initiate appropriate interventions, and continue patient monitoring. Ultimately, effective rapid response begins at the bedside. **When nurses recognize early warning signs and translate recognition into timely action, opportunities for early intervention are strengthened.**

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