THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF SURGERY

A PROSPECTIVE STUDY TO COMPARE CLINICAL ACUMEN AND MODIFIED EARLY WARNING SCORE (MEWS) IN POST-OPERATIVE SURGICAL IN-PATIENTS AT THE UNIVERSITY TEACHING HOSPITAL, LUSAKA, ZAMBIA

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A dissertation submitted in partial fulfilment of the requirement for the award of Masters of Medicine in General Surgery

DECLARATION

I hereby declare that this dissertation represents my own work and has not been presented either wholly or in part for a degree at the University of Zambia or any other university.

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APPROVAL

This Dessertation of Dr Wilson Mbewe has been approved as fulfilling the requirement of the award of the degree of Master of Medicine in General Surgery by the University of Zambia.

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ABSTRACT

Background: The safe recovery of patients admitted to hospital depends on early detection of clinical and physiological deterioration and undertaking appropriate intervention to prevent mortality. Modified early warning score (MEWS) is a structured objective way of monitoring patients' condition using physiological parameters. It is an aggregation of vital signs, mental status assessment and urine output values taken by nurses during observations. Unlike the traditional charts, MEWS guides the nursing staff on when to call for medical staff to intervene. Therefore, eliminating the total reliance on nursing staffs' clinical acumen to identify deteriorating patients and decide on when to call for help (Kyriacos2011).

The aim was to assess the effectiveness of modified early warning score (MEWS) as a tool for early identification of deteriorating post-operative surgical in-patients and facilitating early intervention. Specifically to determine the effect of using a cell phone on doctors' rate to review patients.

Methods: This prospective observational study was done at the University Teaching Hospital (UTH) in Lusaka over a period of two months involving all post-operative patients above the age of 18 years and excluding day cases. The patients were divided into three groups based on the tools for monitoring used in the ward; the first group used MEWS and a cell phone, the second group used MEWS alone and the third employed traditional charts. Nurses collected demographic data, clinical data, vital signs and MEWS. The qualitative data was analyzed using mean, percentage, Fisher exact test and two-sample t test with equal variances.

Results: Of the 113 patients the median age was 40 (SD 16.9) years, 37 (33%) were females and 76 (67%) were males. 47 (42%) had elective while 66 (58%) had emergency surgery, 25 (22%) were in group with MEWS only, 41 (36%) MEWS & phone and 47 (42%) used traditional chart.

Doctors were called a total of 14 times to review patients who needed additional treatment. 7 times (50%) were in a group of MEWS and cell phone and 4 times (29%) in MEWS alone while the least number of times (3) was in the group that employed traditional charts. The difference was significant (P=0.034) using the Fisher exact test.
The duration to review patients was shortest using the phone with mean difference of 33 minutes and P= 0.0062 at 95% using the two-sample t test with equal variances. Treatment outcomes were as follows 94 (83.19%) discharge while 18 (15.93%) died and 1 patient left against medical advice.

Conclusion: There is a need for nurses on the wards to be equipped with a monitoring tool that aids their clinical acumen in identifying deteriorating patients. They also need a media of communicating to doctors quickly when the physiological and clinical deterioration first become apparent in the patient. This study suggest that the routine implementation of MEWS and improved nurse doctor communication in a low resource setting hospital like UTH can facilitate early implementation of additional care to prevent further patient deteriorating and death.

A similar prospective study should be done at UTH involving a larger more heterogeneous group of patients over a longer period. The Nurses need to be adequately trained on MEWS to ensure consistence in documentation of vital signs. The study should also include the assessment of MEWS by nurses and doctors.

DEDICATION

To my children Jonathan, Wankumbula, Chikondi, Alinase and the memory of my son I never got to hold in my arms.

ACKNOWNLEDGEMENTS

This work has been possible because of the support and contribution of many great people I may not be able to mention.

I’m grateful to all my mentors in the department of surgery for the intellectual guidance during my study. I wish to thank most sincerely my supervisors Dr R. Zulu and Dr J Munthali for taking time to read through the paper and making vital contributions.

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I also thank my parents Allan and Margret Mbewe for the great support and always making sure I was doing my work. Mr and Mrs Jonathan Mbewe thank for showing me the way.

Most dearly to my wife Lucy and family, thank you for allowing me to spend more time working instead of being with you.

ABBREVIATIONS AND ACRONYMS

AVPU:	**A**lert, Reacting to **V**oice, Reacting to **P**ain, **U**nresponsive
BP:	Blood Pressure
CNS:	Central Nervous System
EMT:	Emergency Medical Team
EWS:	Early Warning Score
HDU:	High Dependent Unit
ICU:	Intensive Care Unit
I.V:	Intravenous
JRMO:	Junior Resident Medical Officer
LAMA:	Leaving Against Medical Advice
MEWS:	Modified Early Warning Score
UTH:	University Teaching Hospital

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CHAPTER ONE: INTRODUCTION

1.1 Background Information

The safety of patients admitted to hospital can be improved by early detection of clinical and physiological deterioration and undertaking appropriate intervention to prevent mortality. Modified early warning score (MEWS) is a structured objective way of monitoring patients' condition using physiological parameters. It is an aggregation of vital signs, mental status assessment and urine output values taken by nurses during observations. The purpose of MEWS is to facilitate prompt communication between nursing and medical staff when deterioration in a ward patient's condition first becomes apparent on the observation chart (Gardener-Thorpe2006). Unlike the traditional charts, MEWS guides the nursing staff on when to call for the medical staff to intervene. Therefore, eliminating the total reliance on nursing staffs' clinical acumen to identify deteriorating patients and decide on when to call for help (Kyriacos2011).

The Junior Resident Medical Officers (JRMO) do not cover the ward out of hours at the University Teaching Hospital (UTH). This has led to doctors not been stationed on the wards to attend to patients who change condition and need addition care after 16:00hrs. As a result medical care of in-patients is dependent on the under staffed nurses. Thus deteriorating patients are often not noticed in time and the doctor is only called upon when the patient is gasping and often too late to resuscitate the patient. Therefore, there is need to equip the nurses with an objective assessment tool to enable them pick up deteriorating patients early and communicate to the Doctors on call particularly during off hours.

The effective use of MEWS on surgical wards can facilitate early identification of deteriorating post-operative patients in order to ensure early and rapid intervention. However, there is very limited evidence available in the literature on the validity of MEWS

in resource limited settings like Zambia and other developing countries to warrant its implementation (Kyriacos 2011).

1.2 Problem Statement

The decision of nurses to call for assistance promptly often determines the survival of patients on the ward (Cioffi 2000a).The traditional chart method of monitoring patients in use at the UTH does not guide the nurse at which point the patients' change in condition warrants review by the concerned doctor. Therefore, the clinician is often called too late only to certify the patient dead.

Research Question

Is MEWS more effective than nurses' subjective clinical acumen at detecting deteriorating surgical in-patients and facilitating early intervention?

1.3 Study justification

A study done at a teaching hospital in Netherlands in which MEWS was applied retrospectively to all medical and surgical patients who died unexpectedly or underwent adverse events showed that 81% could have been identified early (Ludikhuize 2012). More cases could have been picked up but their files had incomplete vitals hence excluded from the study. The mortality and morbidity in these patients could have probably been reduced if MEWS was used for monitoring.

The principal investigator observed that most of the times the nurses at UTH delayed to call the doctor when the patient's condition deteriorated. Hence, this study was undertaken to determine if MEWS is better than Nurses' clinical acumen at identifying deteriorating patients and facilitating early intervention. Ultimately reducing morbidity and mortality due to delayed intervention.

1.4 Objectives

1.4.1 Research Objectives

To assess the effectiveness of modified early warning score (MEWS) as a tool for early identification of deteriorating post-operative surgical in-patients and use of the cell phone to facilitating early intervention at the University Teaching Hospital (UTH) in Lusaka.

1.4.2 Specific Objectives

- To compare the number of deteriorating surgical in-patients identified by using the traditional charts and MEWS monitoring tools.
- To determine the effectiveness of using a cell phone as opposed to sending a messenger to prompt doctor review of deteriorating patients.
- To determine the accuracy of Nurses on complete documentation of vital signs
- To determine if patients' demographic, medical condition and surgery are predictors of patients' deterioration.

CAPTER TWO: LITERATURE REVIEW

Modified early warning score is a bedside tool used to evaluate and monitor the condition of the patients using five parameters: respiratory rate, heart rate, systolic blood pressure, temperature and mental status by assessing if the patient is Alert, Reacting to Voice, Reacting to Pain, Unresponsive (AVPU) score (Subbe 2001). A normal vital sign is scored zero while a below or above value is score 1, 2 or 3 based on the extent of deviation from the normal value parameters as illustrated in Table 1 below.

Table1: Modified Early Warning Score

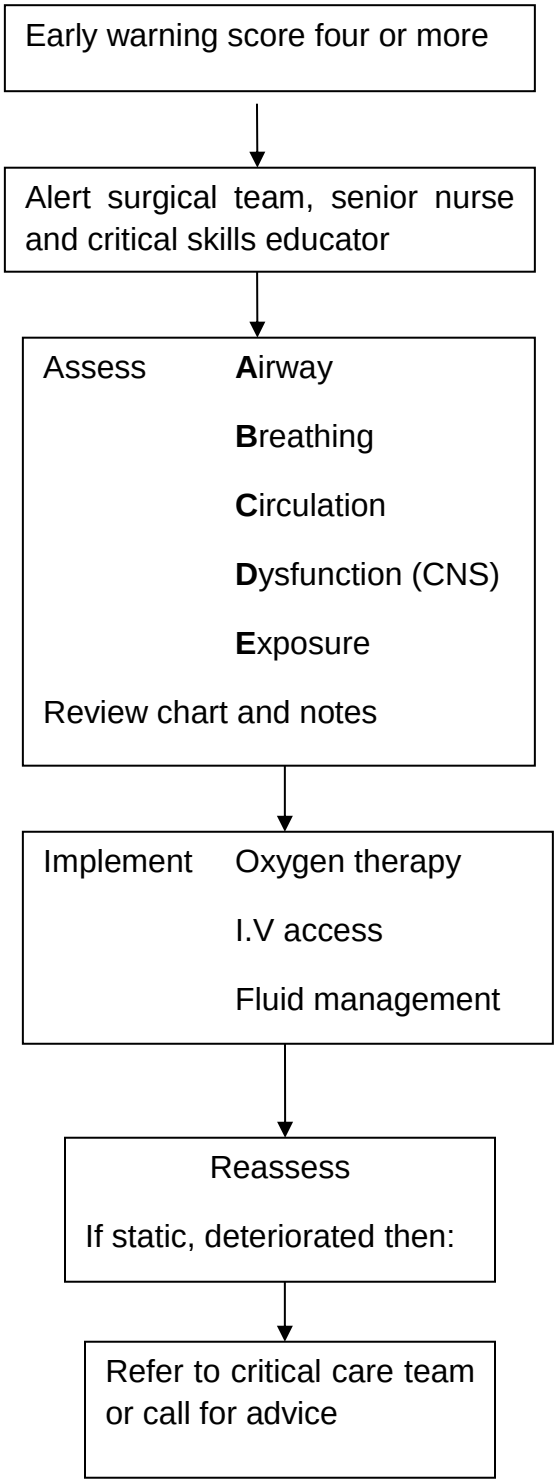
Score	**3**	**2**	**1**	**0**	**1**	**2**	**3**
Respiratory rate (min^{-1})		≤8		9-14	15-20	21-29	>29
Heart rate (min^{-1})		≤40	41-50	51-100	101-110	111-129	>129
Systolic BP (mmHg)	≤ 70	71-80	81-100	101- 199		≥200	
Urine output (ml)	Nil	<0.5					
Temperature (^oC)		≤ 35	35.1-36	36.1-38	38.1-38.5	≥ 38.6	
Neurological				Alert	Reacting to voice	Reacting to pain	Unresponsive

Source: Gardner-Thorpe J 2006

The Nurses during observation of vital signs records the score for each parameter and sum them up to get the total MEWS score. The higher the MEWS score indicates the more critically ill the condition of the patient is. If the sum of the scores is 4 or more the attending nurse calls the concerned clinician to review the patient.

Some centres in developed countries that implement MEWS have an Emergency Medical Team (EMT) that responds to all MEWS alert. The EMT perform a primary survey of the patient and implement appropriate resuscitation measures (figure 1).

Figure 1: Call-out algorithm



Source: Gardner-Thorpe (2006)

Several studies have demonstrated that the important factors in the safe management of in-patients on the ward particularly critically ill patients who are at high risk of deteriorating is accurate documentation of vital signs, correct interpretation and ready available Emergence Team to call when indicated (Mitchell 2010, Subbe 2001 and Cahill 2011). There is strong evidence to show that implementation of MEWS systems in hospitals in high resource countries improve documentation of vital signs (Mitchel 2010, Mcbride 2005, and Noami 2013). However, some other literature has shown that existing tract and trigger systems implemented alone have not improved outcomes and fall to identify patient who need additional care (Jansen and Cuthbertson, 2010). More research work is required to validate the utilisation of warming scores if their potential to improve early detection of critical illness is to be achieved.

Nurses and medical staff caring for patients admitted in hospital sometimes fail to recognize early signs of deterioration leading to treatment delays, high morbidity and mortality (McQillian1998, Mitchell 2010, Naeen, 2005 and Goldhill, 2001). This in part has been shown by some studies to be due to Nurses having lack of confidence in their decision to call the doctor in patients who need additional care. Most nurses experience a lot of uncertainty associated with anxiety when calling emergency medical team to review patients they think are deteriorating (Cioffi 2000 and Ellis 1997). MEWS removes this subjective fear of calling the doctor when it may not be indicated. However, MEWS also threaten the unique ability that some nurses have of recognizing deteriorating patients by their feelings which are based on experience and not reproducible (Smith 1988, Grossman 1997, and Cioffi 2000).

Effective monitoring of patients by implementing MEWS requires consistency in recording vital signs and can only be achieved by nurses undergoing continuous education and audits (Gao 2003, Subbe 2007, Prytherch 2006, 2010, and Noami 2013).
The diagnosis of the patient is not incoperated in EWS because it might make the system complex and less effective (Subbe 2001).

Total reliance on MEWS alone eliminates nurses' intuitive assessment of the patients being unwell (Clioffi 2000a) and other clinical signs like diaphoresis. Severely ill patients can also be missed if single abnormal parameters are ignored (Kyriacos 2011). Therefore, MEWS should not be implemented in isolation.

CAPTER THREE: METHODOLOGY

3.1 INTRODUCTION

This part of the dissertation provides detailed descriptions of the methods that were used in the study. Important aspects that are described include data collection techniques, study type, sampling methods and procedures, data collection and analysis, ethical considerations.

3.2 Research design

This was a prospective observational study carried out at the University Teaching Hospital over a period of two months. The study compared traditional chart method of monitoring patients and MEWS at identifying deteriorating post-operative surgical in-patients to facilitate early intervention at UTH in Lusaka.

3.3 Study Site and population

The University Teaching Hospital is located in Lusaka the capital city of Zambia, Central Africa. UTH is the largest tertiary referral hospital in Zambia with a bed capacity of over 2000 and manages patients from all over the country.

This study was conducted in the department of surgery which has five general surgery and orthopaedics units respectively. The other units include urology, plastic, Neurosurgery, Otorhinolaryngology, Ophthalmology, Cardiac, spine and Paediatric Surgery.

The study population was comprised of all nurses caring for post-operative patients admitted on surgical wards under the study at the University Teaching Hospital. The

department of surgery has six general surgical wards in G block and all the six wards were employed in the study.

3.4 Sampling and Sample size calculation

The study target population was all nurses caring for post-operative patients admitted on the surgical wards at UTH. A meeting was held with all the ward in-charges and the matron in which the wards were allocated to three groups by using a random sampling system. Six pieces of paper two labelled group 1, group 2 and group 3 respectively were folded and shuffled in a box. The sister in charge of each ward was asked to pick a piece of paper blindly and all the nurses under her ward were allocated to that particular group. At least one nurse in each shift was enrolled in the study at their own free will to ensure that each ward is covered 24 hours.

The groups were as follows:

- First group: Nurses were provided with MEWS charts, Cell phone and talk time to call concerned JRMO when the patient score MEWS of 4 or more.
- Second group: Nurses were using the traditional method currently employed at UTH to monitor patients.
- Third group: Nurses used MEWS to monitor patients and communication means currently employed at UTH. No cell phone and talk time to call JRMO was provided.

The MEWS was used alongside the UTH monitoring system therefore; the study did not interfere with the management of patients on the ward.

During normal working hours between 08:00hrs and 16:00hrs there are JRMOs on the wards to manage patients who change condition. However, after hours ward reviews of deteriorating patients are done by the surgical unit on call. The nurse on duty normally sends a note with a cleaner to casualty, female and male surgical wards to communicate to the JRMO on call on deteriorating patients. Sometime the nurses go personally to

casualty to call the doctor to review the patient but often this is not possible due to limited number of nurses on night shift.

Three cell phone were bought for the study. The wards under the first group were provided with a cell phone each while the other phone was stationed in female surgical ward to reach the doctors on call. Each time the patient in this group scored a MEWS of 4 or more the nurse would call the number in female surgical ward to communicate the condition of the patient to the doctor on call. The doctors were not informed about the study and therefore, they were not aware that their response to review patients on the ward was been studied.

All nurses in the wards in first and second groups in which MEWS was employed underwent orientation training on how to use MEWS. The workshop was organised and conducted by the principle investigator.

The nurses who took part in the study were all given continuous professional development (CPD) points which are required for them to renew their practicing licenses.

3.5 Inclusion and Exclusion criteria

3.5.1 Inclusion criteria

- Nurses caring for Post-operative patients admitted to surgical wards under the study and who gave consent to take part in the study.
- All post-operative patients who are 16 years and above admitted in the ward under the study.

3.5.2 Exclusion criteria

- Nurses in the surgical wards who refuse to consent to the study
- All surgical day cases were not part of the study because these patients were discharged the same day of the operation.

- All post-operative patients below the age of 16 years because these patients are admitted in the paediatric surgical wards.

3.6 Data Collection Techniques and Tools

Quantitative methods of data collection were used in this study. The data for the study was collected using data collecting sheets attached as appendix 1. The nurses enrolled in the study in the first and second groups collected demographic and all MEWS related data point in post-operative patients every day till the time of discharge. MEWS was calculated each time the vitals were done and the doctor called with the score of 4 or more. The data collected included diagnosis of the patient, comorbidities, operation, duration, resuscitation measures taken by the doctor when called to review the patient and the ultimate treatment out. MEWS related data include respiratory rate (breaths per minute), Heart rate (beats per minute), Systolic Blood Pressure (Millimetres of mercury), Axillary temperature (Degrees Celsius), urine output (millilitres) and Neurological or level of consciousness was assessed using Alert, Voice, Pain, Unresponsive (AVPU) score.

Nurses in the third group where the traditional charts were used only collected demographic and clinical data but not MEWS related data. They also documented treatment out (discharge, mortality or LAMA) whether the doctor was called or not, duration and resuscitation when called done. The principle investigator collected the information every morning and compared it for correctness using the patient's file. The information was kept under a locked file cabinet in the department of surgery only accessible to the principle investigator.

3.8 Data processing and analysis

The data collected was processed and analysed both manually and the use of computer software Stata. During data processing, the information was checked for completeness

and internal consistency. The process also involved categorisation, coding and summarization of data on excel spread sheets as well as frequency counts for each variable and cross tabulation.

Statistical analyses were performed using Stata/SE 13.0 software. Parametric data like age, duration and MEWS are presented as means with standard derivation while categorical data is presented as frequencies and percentages. Categorical data include sex, type of operation, diagnosis, comorbidities and treatment outcome. The statistical significance of the doctor being called was calculated using Fisher exact test because of the small numbers involved at P-value at 95% confidence interval. The time the doctors took to review patients was analysed using two-sample t test with equal variances.

Logistic regression was used to analyse the influence of patients' demographics, medical condition and surgery on patients' deterioration in the post-operative period.

3.9 Variables

3.9.1 Dependant Variable

The dependant variable for this study was deteriorating patients and its indicator was resuscitation done by the doctor when called upon to review a deteriorating patient. The resuscitation for the purpose of this study was defined as any documented intervention taken by the Doctor when called to review a patient. This included any measures taken to improve the condition of the patient like oxygen therapy, pain management, fluid management, antibiotics, surgery, and transfer to higher dependence care unit like acute bay or ICU and definitive management.

3.9.2 Independent Variables

The following are the independent variables for this study:

- Age
- Sex
- Diagnosis
- Co-morbidities
- Type of Operation
- Time taken to review the patient by the doctor from the time the nurse makes the decision to call the doctor.
- MEWS parameters
- Number of completed vital signs
- Mortality

3.10 Ethical Procedure

The purpose of the study was explained to participants and informed written consent obtained from all participating Nurses. Special ethical approval was granted by University of Zambia Biomedical Research and Ethics Committee (UNZABREC). The UTH management also granted permission to conduct the study from UTH.

The participants were assured of anonymity, confidentiality and no names or personal identification was used except through codes in data collection. The file number was not reflected in the process of data collection.

CAPTER FOUR: FINDINGS

There were a total of 113 post-operative patients who met the inclusion criteria and monitored in this study. The mean age of the study population was 40 years (SD16.9) with the youngest patient been 18 years old while the oldest was 86 years as shown in

Table 2. The majority of patients in the study were male comprising 76 (67.26%) while females were 37 (32.74%).

66 (58%) of all the patients in the study underwent emergency surgery while 47 (42%) had elective surgery as shown in table 2. 47 (41.59%) were in the third group where traditional charts were used while 41(36.28%) and 25 (22.12%) patients were in the first and second group respectively in which MEWS with a phone and MEWS alone respectively were employed to monitoring as shown in Table 2 below.

Table 2: Demographic characteristics and group distribution

Parameter		**Frequency (n)**	**Percentage**
Age in years [Mean (SD)]		40.19	16.93
Sex	Female	37	32.74
	Male	76	67.26
Type of Operation	Elective	47	41.59
	Emergency	66	58.41
Group	MEWS & Phone	41	36.28
	MEWS	25	22.12
	Traditional Chart	47	41.59

Table 2 the demographic characteristic of the patients in the study and distribution in each group.

Table 3: Diagnosis

Diagnosis	**Frequency**	**Percentage (%)**
General Surgery	78	69.03
Orthopaedics	18	15.93
Urology	10	8.85
Neurosurgery	7	6.19

Total	**113**	**100.00**

The above table 4 shows the general distribution by subspecialty of the conditions the patients presented with which warranted the indication for the operation. 78 (69.03%) of the patients in the study were operated on by general surgeons. The operations included abdominal surgery for appendicitis, cholelithiasis, hernia, intestinal obstruction and peritonitis due to different causes. The other operations were for gangrene, tumours, thyroid and parotid disease. While the rest of the patients (35) were under orthopaedics, urology and neurosurgery. Most of the Orthopaedic operations were ORIF, while neurosurgery include craniotomy and urology operations were for BPH, urinary retention, urethral stricture, bladder and prostate cancer.

83 (73.45%) of the post-operative patients in this had no other diseases other than the primary indication for their operation. 15 (13.27%) of the patients had non-communicable conditions comprising of hypertension, diabetes mellitus, sickle cell disease and cancer. While the other 15 (13.27%) had infections as their co-morbidity of which 9 (7.96%) had HIV and the rest included tuberculosis, gastritis and others. As illustrated in Table 4 below.

Table 4: Co-morbidities

Co-morbidities	Frequency	Percentage (%)
None	83	73.45
Non-communicable	15	13.27
HIV	9	7.96
Communicable	6	5.31
Total	**113**	**100.00**

The nurses on the wards called doctors a total of 14 times during the study period to review patients who had changed condition and needed addition treatment. 7 times (50%) of these were in group one in which MEWS and cell phone was used and 4 times (29%) in group two were only MEWS used while the least number of times (3) was in the group that employed traditional charts to monitor patients. The P-value at 95% confidence interval was calculated at 0.034 using the Fisher exact test and statistically significate. Therefore, these results indicate that MEWS is probably better at identifying deteriorating post-operative surgical patients than the tradition charts employed at UTH. Table 5 below illustrate the above information.

Table 5: Doctor called to review patient.

Group	Not called n (%)	Called n (%)	P- Value
MEWS & Phone	241 (29.72%)	7 (50.00%)	0.034*
MEWS	132 (16.28%)	4 (28.57%)	
Traditional Charts	438 (54.01%)	3 (21.43%)	
Total	**811 (100.00)**	**14 (100.00)**	

*Fisher's exact test

The dependant variable for this study was deteriorating patients and its indicator was resuscitation done by the doctor when called upon to review a deteriorating patient. The resuscitation for the purpose of this study was any documented intervention taken by the Doctor when called to review a patient**.** All the 14 times the doctors were called to review patients they instituted some form of intervention therefore, for the purpose of this study all the patients were deteriorating.

Doctors responded in the shortest time to review deteriorating patients in the group that employed MEWS and cell phone with the mean time of 16 minutes ranging from 5 to 36 minutes. The group using MEWS alone had a mean of 48 but ranging from 20 to 90 minutes. While the wards using traditional charts had the longest mean of 52 with a range of 30 to 70 minutes. The combined mean of the latter two groups was 49 minutes with a mean difference of 33 minutes compared with the wards using cell phones. The P-value was calculated to be 0.0062 at 95% confidence interval using the two-sample t test with equal variances which is statistically significant as shown in table 8. Therefore, the cell phone as the means of communication between nurses on the ward and doctors on call is probably better at facilitating rapid response as opposed to the mean of communication employed at UTH.

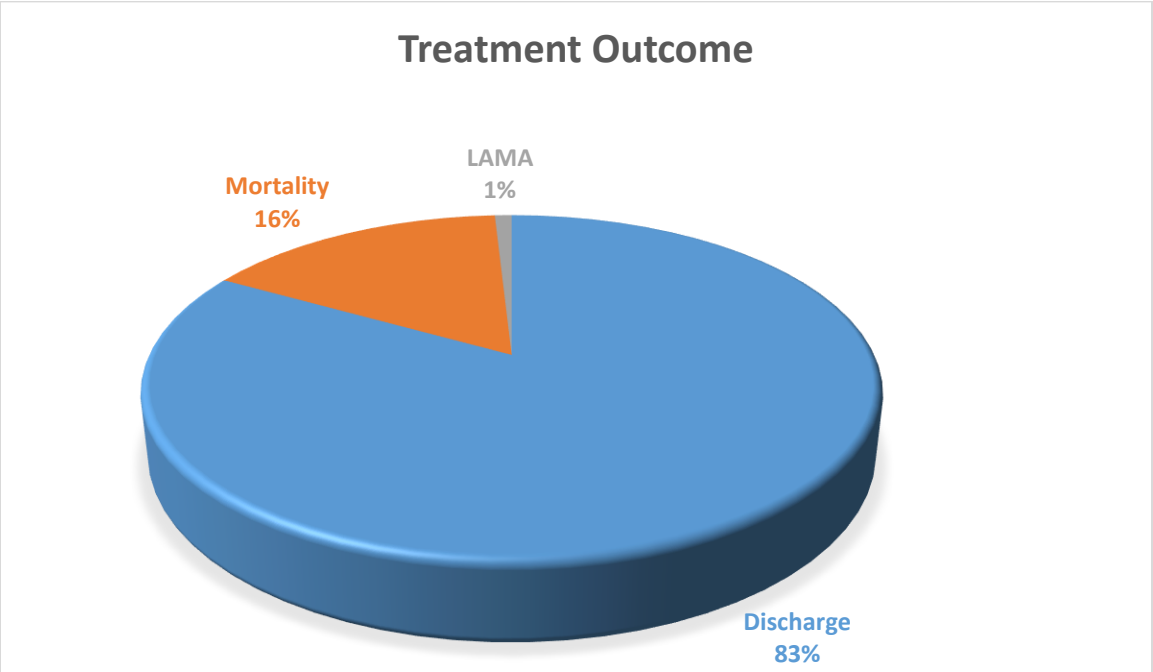
Table 6: Duration taken to review the patient

Group	Observations	Mean	SD	95% Conf. Interval
MEWS & Phone	7	16.28	10.31	0.0062*
MEWS & Traditional charts	7	49.29	24.29	
Combined	14	32.79	24.79	
Difference		-33		

*Two-sample t test with equal variance

94 (83.19%) of the patients at the end of the study were discharged while 18 (15.93%) died and 1 patient left against medical advice (LAMA) as shown in the pie chart figure 2 below. For the purpose of this study all the patients discharged and LAMA were assured alive.

Figure 2: Treatment outcomes



The information on the number of vital signs done was only collected in the wards monitored by MEWS but not in the wards using the traditional charts. Therefore, the accuracy of nurses' on complete documentation of vital sign was only done on wards that employed MEWS. A total of 367 (95%) of all vital signs observations done in the wards that employed MEWS were incomplete (5 out of 6 observations done) because urine output was done. It was observed that urine output monitoring was mostly done only in urology patients.

Table 7: Shows the number of completed vital signs.

Group	Total Number of completed vital signs	
	Incomplete n (%)	**Complete n (%)**
MEWS & Phone	235 (93.55)	16 (6.45)
MEWS	132 (96.35)	5 (3.65)
Total	**367 (94.95)**	**19 (5.05)**

The factors associated with patients' deterioration were analysed by linear regression at a P value of 0.05. The only factors that were shown to be statistically significant and independently associated with patients' deterioration was only HIV comorbidity (Coef. -0.0447, std. Err 0.0206 P-value =0.004). The variables that were analysed include age, sex, diagnosis, comorbidities, type of operation and post-operative hospital stay.

CAPTER FIVE: DISCUSSION OF FINDINGS

The findings of this study indicate that MEWS is better than Nurses' clinical acumen at identifying deteriorating post-operative patients. They were more deteriorating patients identified in the wards that employed MEWS (79%) than the traditional charts (21%) with a statistical significance of P=0.034 at 95% confidence interval calculated using the Fisher exact test. These finding are in keeping with a prospective observational study done by Kruisselbrink el al at Mulago National Referral Hospital in Uganda with similar low resource setting like UTH which demonstrated that MEWS could a useful tool to identify critically ill patients on general wards. They identified that 11.7% of ward patients had critical illness and an associated high mortality of 22.6% using MEWS with a threshold of 5.

The findings of the statistically significant difference of P=0.0062 at 95% confidence interval using the two-sample t test in the time taken to response to review patients imply that the is a higher chance of a doctor to respond more quicker when called with a cell as opposed to the current means of communication employed at UTH. Therefore, in view of these findings the Principal investigator's observation of doctors at UTH been called too late to review the patients may explained in part by poor communication and nurses' inability to identify deteriorating patients. This is in keeping with several studies that show that nurses and medical staff caring for patients admitted in hospital sometimes fail to recognize early signs of deterioration leads to treatment delays, high morbidity and mortality (McQillian1998, Mitchell 2010, Naeen, 2005 and Goldhill, 2001).

The study by Kruisselbrink in Uganda also showed in the univariate analysis that HIV status was a statistically significant predictor of mortality but was not included in the multivariable regression analysis. This study found HIV status as the only factors that was a statistically significant predicator of clinical deterioration warranting additional care. However, HIV status was not determined in all the patients.

The strength of this study is its prospective, observational design and the variety of post-operative patients from different surgical subspecialties representing a wide range of pathologies.

LIMITATIONS

The limitation of this study was the small of patients and short duration therefore, the results may not be generalised.

The nurses in the study didn't undergo extensive training on MEWS. The information on the number of vital signs was not collected in the wards using the traditional charts. Therefore, the comparison of nurses' accuracy on complete documentation of vital signs could not be done between wards that employed traditional charts and MEWS.

Urine output was not done on most patients hence, this could have negatively affected the MEWS. Some patient with poor urine output could have been scored a lower MEWS and their deterioration missed.

CAPTER SIX: CONCLUSION AND RECOMMENDATIONS

The findings of this study demonstrate the need for nurses on the ward to be equipped with a monitoring tool that aid their clinical acumen in identifying deteriorating patients. They also need a reliable and efficient mean of communicating to doctors on call when the physiological and clinical deterioration become first apparent in the patient. The other strategy that might improve the safety of patients and reduce mortality on the wards is the establishment of a trained medical response team dedicated to management of critically ill and deteriorating patients after 16:00hrs. This study suggest that the routine implementation of MEWS and improved nurse doctor communication in a low resource setting hospital like UTH can facilitate early implementation of additional care to prevent further patient deteriorating and death.

Recommendations

1. A multicentre prospective study should be done in Zambia involving a larger more heterogeneous group of patients over a longer period and nurses adequately trained on MEWS to ensure consistence in documentation of vital signs. The study should also include the assessment of MEWS by nurses and doctors.
2. The Ministry of Health and UTH management should consider linking the wards and the casualty department by phone to facilitate easy and fast communication of deteriorating patients to doctors on call.
3. The government should consider introducing MEWS education in the curriculum for nursing and medical students.

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APPENDICES

Appendix I: Data Collecting Sheet

A. Demographic Data

Code:.....

1. Age of Patient:.....

2. Sex:

a) Female ☐

b) Male ☐

3. Date of admission:.....

4. Date of operation:.....

5. Date of discharge: .....

B. Clinical data

6. Diagnosis: .....

7. Co-morbidities: .....

8. Type of Operation:

a) Elective ☐

b) Emergence ☐

9. Operation: .....

10. MEWS: .....

10.1. Respiratory rate: .....

10.2. Heart rate: .....

10.3. Systolic BP: .....

10.4. Temperature: .....

10.5. Neurological: .....

10.6. Urine output: .....

10.7. Number of completed vital signs .....

10.8. The highest MEWS parameter .....

11. Doctor called to review patient:

a) Yes ☐

b) No ☐

12. If yes state resuscitation measure taken: .....

13. Time taken by the doctor to attend to attend the patient when called..... (Minutes)

14. Treatment outcome:

a) Discharge ☐

b) Mortality ☐

c) Transfer to ICU or HDU ☐

d) Others.....

Appendix II: INFORMATION SHEET

My name is Dr Wilson Mbewe. I am pursing a Master of medicine in general surgery and carrying out a research to compare the use of traditional charts with MEWS in determining clinical deterioration in post-operative patients. This will involves taking the routine observations: temperature, respiratory rate, heart rate, BP, level of alertness and urine output at the usual time as normally done on the ward.

Some wards will continue using the traditional methods currently employed at UTH while others will use MEWS. In MEWS the vital signs will be summed up using a chart that will be provided. If the total value is high than 4 the nurse will call the doctor on call to review the patient and manage according.

The information will be collected using the data collection sheet and analyses.

Names will not be used in the research to protect the participants from being identified and all the information will be kept secret.
The participant can withdraw at any time from the study without any consequences.

Risk and Benefits

There are no risks to the participants because the study utilize patients' clinical data drawn from the files.

The patient may benefit from an early intervention by having his or her change in condition being picked up in time that may lead the nurses to call the doctor on call.

Taking part in this study is at free will and will not affect your work in any way should you choose not to be involved or withdraw from the study.

Thank you for your time and consideration.

If you want more information or ask questions please get in touch with me on:

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Appendix III: CONSENT

I..... do hereby agree at free will to take part in the Prospective study to compare clinical acumen and MEWS in surgical in-patients at the University Teaching Hospital. I am informed that I am free to withdraw from the study or seek clarification whenever I wish without any consequences to me or my work.

Participant signature or Thumb print:……

Witness signature:……

Date:

If you want more information or ask questions please get in touch with me on:

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