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Improving Emergency Attendance and Mortality – The Case for Unit Separation

Améliorer la fréquentation des urgences et de la mortalité - le cas pour l'unité de séparation

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ABSTRACT

BACKGROUND: **Emergency attendance and mortality which are reliable indicators of quality of care, have been of concern to many health institutions. Different models are being proposed to improve emergency outcomes in different parts of the world. A model to separate a single emergency Unit into multiple emergency units has been tried in Ghana.**

OBJECTIVE: **The objective of the study was to find the effect of the Unit Separation Model (USM) on the quality of emergency care delivery in a developing country.**

METHODS: **The study compared the outcomes (attendance and mortality) in a Single Emergency Model (SEM) with a USM, over a two-year period. Two groups of patients were studied - the SEM phase comprising 809 patients, and the USM phase comprising 3,505 patients. Data on patients' attendance and mortality in the two groups were analysed.**

RESULTS: **Attendance increased four fold in the USM period compared to the SEM period. This also reflected in increases in individual unit attendance. There was almost a three fold increase in medical and surgical emergencies, over ten fold increase in gynaecological emergencies and over twenty fold increase in paediatric emergencies. There was a statistically significant reduction in emergency mortality in the USM period compared to the SEM period. Reductions in mortality were from 27.8% to 7.9% for Surgery, 46.3% to 23.2% for Medicine, 17.5% to 0.8% for Gynaecology, and 50.0% to 8.4% for Paediatrics (p-value <0.001 for each unit); and overall from 36.7% to 10.9%.**

CONCLUSION: **It is concluded that Unit Separation Model with Specialty based emergency care has a positive impact of increasing emergency admissions and reducing mortality, without compromising quality. This also means that avoidable mortalities occur in the Single Emergency Model system. WAJM 2009; 28(1): 318–322.**

Keywords: **Attendance, Emergency, Mortality, Unit Separation.**

RÉSUMÉ

CONTEXTE: L'Assistance de secours et mortalité qui sont les indicateurs fiables de la qualite de soin, ont été une préoccupation de beaucoup des institutions de la santé. Different modeles sont proposés d'améliorer des résultats dans différentes régions du monde. Un modèle pour séparer une unité simple de secours dans les unités multiples de secours a été essayé au Ghana

OBJECTIF: L'objectif de l'étude est de trouver l'effet de la Modele séparation d'Unité (MSU) sur la qualité de la livraison de soin de secours dans un pays en voie de developpement

MÉTHODE: L'etude a comparé les resultants(assistance et mortalité) dans une Modele d'Urgence Unite(MUU) et MSU, sur une période de 2 ans. Deux groupes de patients ont été étudiés dans deux phases - la phase de MUU comportant 809 patients, et la phase de MSU comportant 3505 patients. Des données sur l' assistance des patients et le motality dans les deux groupes ont été analysés.

RÉSULTATS: L' assistance a augmenté quatre replient pendant la période d'étude. Ceci s'est également reflété dans les augmentations d' assistance d'unité individuel. Il y avait presque une augmentation de trois fois des urgences médicales et chirurgicales, plus d'augmentation de dix fois des urgences gynécologiques et plus d'augmentation de vingt fois des urgences pédiatriques. Il y avait une réduction statistiquement significative de la mortalité de secours au cours de la période d'étude dans l'hôpital. Les réductions de la mortalité étaient de 27,8% à 7,9%, pour la chirurgie, 46,3% à 23,2% pour la médecine, 17,5% à 0,8% pour la gynécologie, et 50,0% à 8,4% pour Paediatrics(p-value<0.001 pour chaque unité); et globalement de 36,7% à 10,9%.

CONCLUSION: On le conclut que la modèle de séparation d'unité avec soin basé par spécialité de secours, a un impact positif des admissions croissantes de secours et réduction de mortalité, sans qualité compromettante. Ceci signifie également que les mortalités évitables se produisent dans le Système Simple de Modèle de Secours. ***WAJM 2009; 28(1): 316–320.***

Mots clés: *Assistance De Secours, Mortalité, Séparation D'Unité.*

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Abbreviations: SEM, Single Emergency Model; USM, Unit Separation Model.

INTRODUCTION

Emergency units of many health facilities in Ghana have been experiencing increasing admissions in recent times. Rapid population growth, persistence of preventable childhood diseases, malnutrition, trauma, the H.I.V pandemic and re-emergence of tuberculosis are factors contributing to the increased emergency admissions. The changing pattern of disease towards non communicable ones has added its burden to emergency care.

Mortality among patients presenting in emergency is high and may be a consequence of the quality of institutional care.[1,2] Emergency units worldwide as part of quality assurance have adopted various models and measures to improve mortality outcomes.[2,3] In Ghana, the increasing burden of emergency care may have contributed to the increasing mortality in emergency units. Lack of adequate pre hospital care has contributed to high trauma mortality in our emergency units.[4] Single, dual or multifunctional emergency units are not uncommon, and the increasing admissions to these units have created a challenge for many institutions. This has resulted in expansion of structure and/or resources as a common option to meet the current challenge. The effectiveness of such systems of emergency care adopted in secondary and tertiary facilities is yet to be determined.

An alternative approach employs the industrial concept of operations management in managing the emergency problem where Unit Separation Model (U.S.M), based on operations management principle, replaces Single Emergency Model (S.E.M) in the management of emergency services.

The objective of the study was to find the effect of Unit Separation Model (USM) on admissions and mortality at the 37 Military Hospital in Accra, Ghana.

PATIENTS AND METHODS

Study Design

This was a comparative study of the effect of Unit Separation on emergency outcome. The study period comprised two phases: March to September 2005 and March to September 2006. In the first phase of March to September 2005, patients were seen in a single emergency unit under the SEM. This was followed by a period of preparation of the Unit Separation Model where consultations were made and concerns addressed by the model teams. Units were given time for the establishment of their separate emergency units. The process of implementation took two months from January to February 2006. This was followed by the second phase during which period patients were seen in multiple specialty specific units under the USM. The months of study (March–September) were selected for each year to account for seasonal variations in emergency attendance and mortalities, and the periods when complete data were obtained.

Pre-Intervention or Single Emergency Model

An emergency department of the 400-bed capacity hospital served as a single unit all purpose emergency for surgery, medicine, pediatrics and gynaecology. All patients reporting with any emergency to this department were first seen by the duty doctors of the department who would then triage and provide first line care to all such emergencies. The patients were subsequently reviewed by the specialist team as appropriate. Nurses and allied staff supported the duty doctors all of whom worked on a shift basis.

Ethical Consideration: After a quality assurance assessment, a proposal was made to run this emergency department by specialty units. The hospital's approval was obtained for the implementation of the Unit Separation Model and subsequent collection of data related to the study.

Unit Separation Model

Unit Separation Model (USM) requires that emergency services are provided by specialty teams. Such specialty teams may follow specialist/sub-specialty teams (ST) where available or dedicated specialty teams (DST) that are created to provide such service. This resulted in the creation of four separate emergency units – Medical Emergency, Paediatrics Emergency, Gynaecology Emergency and a Trauma and Surgical Emergency Units. The Trauma and Surgical Unit created a DST to attend to all surgical cases (including accidents and trauma). Each unit determined its duty team composition and its operation system.

Patient Recruitment and Selection

In the SEM, all patients who reported with emergencies were seen at the central point for triaging and further management. Under the USM, patients were triaged based on their referral documents at the reception points. Patients without referrals were triaged at a 24-hour Outpatient polyclinic while the few who are rushed to any of the emergencies are triaged at the receiving units. All patients seen at the emergency units of the hospital were included in the study. Records of attendance and mortality were retrieved from the hospital database system. Patients in SEM were assigned to Specific Units by their diagnosis. Patients in the USM group were assigned by the unit of final admission. Paediatric patients were those 12 years or below.

Exclusion criteria included the following: i) non civilian patients admitted directly to special wards and Intensive Care Unit; ii) patients whose diagnoses were not stated or could not be assigned; iii) patients with multiple diagnoses; iv) patients admitted to the Neonatal Intensive Care Unit.

Definitions and Outcome Measures: The outcome measures for the study were attendance/admissions and mortality in emergency services for both SEM and USM.

Emergency Mortality was defined as deaths that occurred at the emergency units and /or deaths that occurred within 24 hours of admission into the hospital through the emergency units.

Unit Fatality Rate was determined as the number of deaths in a unit over total emergency admissions to the unit. This reflected the mortality of the specific unit.

RESULTS

A total of 4,314 patients with valid

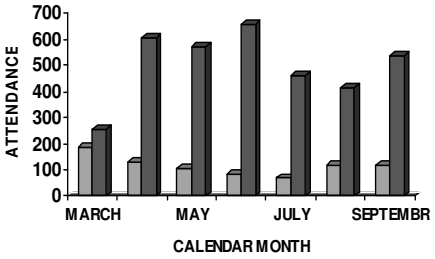

Figure 1: Monthly Emergency Attendance

SEM USM

records seen during the study period were analysed. Eight hundred and nine patients were seen in SEM period while 3505 patients were seen in the USM period. The average monthly emergency admissions were 116 cases in 2005 and 500 cases in 2006. The highest attendance in SEM was in March and April and the lowest was in June and July. The highest attendance in USM was in April and June and the lowest was in March and August (Figure 1).

The pattern of monthly mortality rates for the hospital over the period of study for all emergencies is shown in Figure 2. Total deaths for SEM phase were 297(36.7%) while USM phase recorded 372(10.9%) deaths. There was a decline in mortality of 70% over the study period. The highest mortalities in both phases were in June.

Table 1 shows the emergency attendance and deaths for the various units in both the SEM and USM phases. All units recorded an increase in attendance over the period. Medicine had the highest attendance and Paediatrics the lowest in the SEM phase. In the USM phase, Paediatrics recorded the highest and Gynaecology the lowest attendance. Surgery and Medicine recorded almost a 3-fold increase in attendance while Gynaecology and Paediatrics recorded more than a 10-fold increase in attendance.

Unit fatality rates in both phases are also shown in Table 1. All the units had a statistically significant reduction in emergency fatality rates in the USM over the study period. Reductions in unit fatality rates were from 27.8% to 7.9% for Surgery, 46.3% to 23.2% for Medicine, 17.5% to 0.8% for Gynaecology, and 50.0% to 8.4% for Paediatrics (p-value <0.001 for each unit); and overall from 36.7% to 10.9%. The percentage decline in unit fatality rates was 71.6, 49.9, 95.4 and 83.2% respectively for Surgery, Medicine, Gynaecology, and Paediatrics. The highest unit fatality rates in both phases were in Paediatrics and Medicine while Gynaecology had the lowest unit fatality rates.

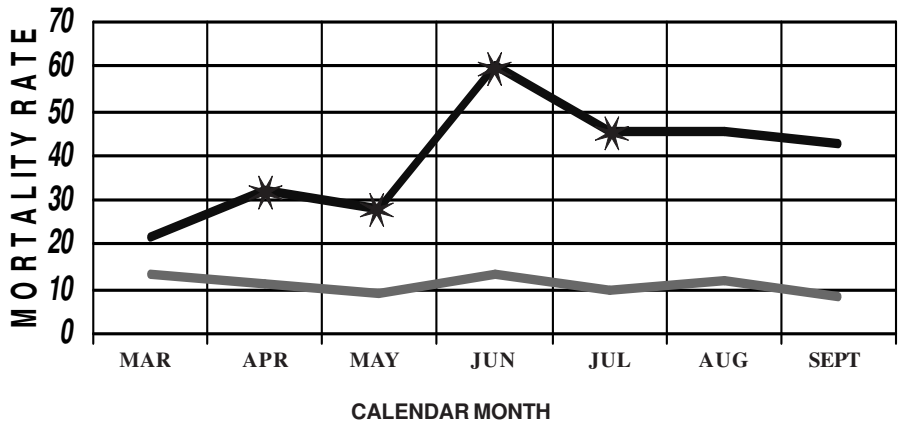

Figure 2: Monthly Mortality Rates for the Two Periods

Single Emergency Model **Unit Separation Model**

Table 1: Comparative Unit Emergency Attendance and Fatality Rates

	SEM	2005		USM	2006			
Unit	**Attendance**	**Deaths**	**UFR* %**	**Attendance**	**Deaths**	**UFR* %**	**Z-score**	**p-value**
Surgery	338	94	27.8	922	73	7.9	7.7	<0.001
Medicine	380	176	46.3	941	219	23.2	8.0	<0.001
Gynaecology	57	10	17.5	641	5	0.8	3.3	<0.001
Paediatrics	34	17	50.0	1001	84	8.4	4.8	<0.001
Total	**809**	**297**	**36.7**	**3505**	**381**	**10.9**	**8.9**	**<.001**

*UFR – Unit Fatality Rate

DISCUSSION

There has been growing worldwide debate about the rise in hospital emergencies and their outcomes.[2-7] Emergency room overcrowding is an ever increasing problem even in advanced countries.[8] This has resulted in many proposed models for emergency care worldwide.[2-6] Regions and institutions are modeling emergency units based on their resources and capacity to achieve the best outcomes. The success of the industrial concept of Operations Management has been gainfully applied to emergency unit care. Generally, Operations Management involves the transformation of processes with focus on efficiency and effectiveness. Changes in operations have been shown to have a positive impact on the outcomes. Unit Separation Model is one such Operations management system that could be applied to emergency care. This study has shown an increase in attendance and reduction in fatality rates using the Unit Separation Model.

There was a four fold increase in overall hospital emergency attendance after Unit separation. The increase in attendance was occasioned by the cumulative effect of multiple emergency units. During the pre intervention phase, Medicine and Surgery contributed almost 90% of emergency attendance. Gynaecology and Paediatric emergency attendances were not significant. In the USM phase, Medicine, Surgery and Paediatrics contributed almost equal proportions to overall emergency

attendance. Most of these new emergency units of above 20-bed capacity had a high bed turnover. The trend of increased attendance that occurred after Unit Separation suggests that a lot of patients who required emergency services in the past were unable to receive care for lack of emergency space. The study also shows that the human resource capacity of the departments was underutilized. Although the change created an initial increased workload on staff, improvement in unit staff management brought efficiency to manage the increased load. This supports previous assertion that hospital resources can be more efficiently utilized.[1]

Mortality or fatality is a clear end point used in quality assurance assessment and may reflect the quality of care in any health institution.[1] Apart from patient delays, mortality in the emergency department is accounted for by other factors including systems and operations at the emergency departments. Overall the mortality rates were reduced by 70%. Using the USM, the two groups showed similar patterns in mortality trends – the peaks of June and August were preceded and followed by reductions in mortalities.

The apparent high mortality rates recorded in the pre-intervention phase can be attributed to the small space and the small sample size, while the low mortality in the post-intervention phase is attributable to the positive impact of the USM. The low mortality achieved is also an indication of the potential of the hospital to provide care to many under improved conditions. Additionally, Unit Separation allows for effective audit and quality assessment making training and protocol implementation easier.

In the USM phase, the pattern of increased unit admissions and reduced mortality occurred in all departments of the hospital. Surgery recorded approximately a three fold increase in attendance and a percentage decline of 70% in unit fatality. The high attendance for surgery in the pre-intervention period was largely contributed to by trauma patients who were admitted in large numbers. Emergency Surgical mortality was reduced from 27.8% to 7.9% over the study period. The inclusion of trauma mortality in this outcome indicates a remarkable improvement. Emergency trauma mortality in well organized and well resourced institutions has been reported at 5.8 %.[7]

Medical admission increased almost three fold and fatality declined by almost 50%. This is an indication that many more patients who need emergency care are either being denied assess or are victims of avoidable deaths. Most of these medical emergencies in patients who sought emergency care were due to hypertension and diabetes related complications, and this may be partly due to an increase in non communicable diseases and probably late reporting.

Gynaecology recorded over a 10-fold increase in attendance and fatality decline of 95%over the study period. The creation of a dedicated team with specialized nurses helped attend to the increasing emergencies. The unit was able to reduce mortality significantly despite a tremendous increase in patient population. Mortality of about 1% was recorded in the post intervention phase. Paediatric attendance increased over 20 fold with a fatality decline of 83%. The increase in attendance was accounted for by high turnover and greater willingness of parents to access a user-friendly specialist paediatric care. This resulted in an observed reduction in attendance of paediatric patients to the polyclinic. These findings appear similar to a Japan International Cooperation Agency (JICA) project in Egypt which achieved a reduction in emergency mortality from 19% to 13% despite tremendous increase in admissions.[9] As with our model patients had access to specialist teams. Paediatric mortality reduction from 50.0% to 8.4% is significant compared to emergency mortality of 12.2% in Southern India.[10]

These results were achieved with marginal increase in resources and some lessons can be learnt from this study. First, avoidable mortalities do occur in our emergency units and there is the need for institutions to recognize these preventable deaths. Some of these mortalities can be reduced by re-examining the operations of emergency units. A study of patterns of mortality will provide useful guides to manage institutional mortalities. Secondly, Unit separation did provide adequate care for those who needed such services. More patients could be attended to over the same time period when multiple units operate simultaneously. Thirdly, remarkable increases in admissions can be achieved without increases in mortality.

CONCLUSION

The results of this study show that Unit Separation Model can increase emergency admissions and reduce mortality. Separation on the basis of sub-specialisation in facilities with specialist services is likely to reduce mortality further. In the absence of adequate resources, the industry concept of operations management which includes improvement in hospital staff management, can improve the efficiency of emergency units and thus lower mortality. Further research into the clinical and epidemiological profile of emergency mortality in the various units will be useful.

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