

REVIEW

A Review On The Benefits And Challenges In Emergency Critical Care Chart Initiation Among Red Zone Patients.

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ABSTRACT

Creating a critical care monitoring system within the red zone, without having a separate space or facility to be called a temporary ICU by implementing close hemodynamic monitoring parameters within the red zone itself would be beneficial for emergency critical care services. We had created an emergency critical care chart, using inspiration from a standard ICU chart that is used in the Malaysian ICU setting. A standard ICU chart contained the parameters of hemodynamics such as blood pressure, heart rate, vital signs, dextrose monitoring, ventilator settings, blood gas analysis measures and intravenous drips and vasopressor or medications. A total of 8 patients were present in the Red zone at the time of the audit. Out of these 8 patients, 6 patients had critical care charts and 2 patients did not have critical care charts. Out of the 6 patients, only one was charted completely whereas the other 5 were incomplete. The incomplete charting of all 5 patients involved the ventilator, blood gases, drip and vasopressor segments. Our review demonstrated that a critical care chart can be useful in the emergency department setting treating patients within the red zone itself when there is a limitation in finding a facility or limitation of space, staffing and sullies to create a ED-ICU model. However further initiatives are needed to make the critical care chart more emergency friendly, reducing clutter,

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incorporating other levels of staff completing the sections of ventilator, blood gases and inotropic support and setting up of policies to ensure compliance to charting.

BACKGROUND

Following admission, resuscitation and treatment of patients admitted to the red zone in emergency departments, many patients will be stranded while waiting for a bed in the ICU or acute wards of respective disciplines¹.

The ED-ICU model that emergency departments and ICUs are familiar with can be a challenge in emergency departments without adequate facilities such as space, staffing and supplies².

Creating a critical care monitoring system within the red zone, without having a separate space or facility to be called a temporary ICU by implementing close hemodynamic monitoring parameters within the red zone itself would be beneficial for emergency critical care services³.

Using inspiration from a standard ICU chart, a critical care chart that encompasses hemodynamic, investigative and treatment parameters can help to better evaluate the patient's hemodynamics and improve critical care services while critically ill patients were awaiting admission to the ICU or acute wards.

METHODS

We had created an emergency critical care chart, using inspiration from a standard ICU chart that is used in the Malaysian ICU setting. A standard ICU chart contained the parameters of hemodynamics such as blood pressure, heart rate, vital signs, dextrose monitoring, ventilator settings, blood gas analysis measures and intravenous drips and vasopressor or medications.

NAME: _____		WT: _____ KG BMI: _____		ALLERGY _____		ZONE: _____	
MRN: _____		AGE: _____		SEX: MALE / FEMALE		HT: _____ CM IBW: _____	
						BED: _____	

TIME	DATE																PASS OVER DETAILS												
	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	1:00	3:00	4:00	5:00	6:00	AM	PM	ON		
NMP READING	Value above								Value above									Value above											
	200								200									200											
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O																													
T																													
Other:																													
Other:																													
TOTAL INPUT /hr																													
Urine																													
NET																													
TOTAL OUTPUT/hr																													

NOTES			
Unstable patients/underpins CPAP/NI on bronchospasm, Start vital sign: Every 15 minutes for 2 hours Every 30 minutes for 5 hours Hourly for 24 hours			
For stable patients: every 4 hours Please mark the bronchospasm time Chart ventilator when setting are changed			
DIAGNOSIS			
CURRENT ISSUES			
TO REVIEW			
TO DO			
DISPOSITION & PRIMARY TEAM			
SHIFT	INPUT	OUTPUT	BALANCE
AM			
PM			
ON			
TOTAL			

This chart was introduced to the paramedics via messaging services for them to familiarize with this chart. Subsequently, a Continuous medical education session was arranged via a zoom meeting, in which all paramedics who will be working in the resuscitation zones were present. This chart was explained in detail and ways to plot the chart were also introduced.

RESULTS

A random audit was carried out one month after the initiation of the critical care charting in the red zone (01/12/2021). The objective of the audit was to collect data on the compliance and usage of the critical care chart in the emergency department, whether the critical care chart was being used or not. For cases that the critical care chart was used, was the information complete or incomplete. In cases where the information was incomplete, sections of the missing data were also documented.

Patient information	Shift	Location	Result	Complete	Incomplete	Remarks/Section not completed
BED 1 Name: LTK	AM	Resus Covid	Non Done	Complete		
Bed 2 *No patient						
Bed 3 Name: AA	AM	Resus Covid	Non Done		Incomplete	Ventilation ABG Drip/Vasopressor
Bed 3 Name: S	AM	Resus Covid	Non Done		Incomplete	Ventilation ABG Drip/Vasopressor
Bed 4 Name: P	AM	Resus Covid	Non Done		Incomplete	Ventilation ABG Drip/Vasopressor
Bed 4 Name H	AM	Resus Covid	Non Not Done			
Bed 5 *No patient	AM	Resus Covid	Non			
Bed 6 NN	AM	Resus Covid	Non Done		Incomplete	Ventilation ABG Drip/Vasopressor
Bed 6 Name: YC	AM	Resus Covid	Non Not done			

The audit was done on the 1st of December 2021, one month after the initiation of critical care chart in the Red zones of the emergency department. The results showed that a total of 6 beds are available in the red zone with the capacity to expand to 12 beds.

A total of 8 patients were present in the Red zone at the time of the audit. Out of these 8 patients, 6 patients had critical care charts and 2 patients did not have critical care charts. Out of the 6 patients, only one was charted completely whereas the other 5 were incomplete. The incomplete charting of all 5 patients involved the ventilator, blood gases, drip and vasopressor segments.

DISCUSSION

The emergency department focuses on delivery of resuscitative care and disposition of patients to the primary team wards or ICU for further and definitive care. However, hospital bed occupancy rate remains high not only in Malaysia but all over the world and this has led to a patient outflow obstruction which then leads to longer waiting times of critically ill patients within the Emergency department⁴.

The backlog of patients and long waiting times for admission to designated acute beds in the wards and ICU has led to many institutions adopting the ED-ICU model. A facility that can cater for critically ill patients with an ICU setup and level of care. Nonetheless it requires a separate space, more staffing and more supplies of critical care equipments⁵

A critical care chart or an ICU chart is a charting system used in the ICUs to monitor patients vital signs, ventilation, important resuscitative investigation such as blood gases, drips, input and output charting as well as requirements of inotropes or vasopressors. It helps in recognising patterns of patients' hemodynamics and an overall picture of the patient's response to treatment which leads to easier recognition of deterioration and response to treatment given.

In view of limited space, staffing and supplies to create an ED-ICU model, the idea to come up with critical care charting within the red zones of the Emergency departments itself was used to monitor and chart hemodynamic parameters and treatments given to critically ill patients in the emergency department⁶.

The results showed that compliance to use the critical care chart within the red zones of the emergency departments was good at 75 percent of patients receiving critical care charting. This could be due to the awareness of the paramedics to chart important findings of the patients to help improve care. A continuous medical education that was carried out before the initiation also probably helped increase the knowledge or critical care within the emergency departments⁷.

Out of the patients receiving the critical care chart, 83 % of them were incomplete. This could be due to the busy Emergency department environments, and needing to continuously attend and resuscitate new patients leaving out vital critical care chart information⁸.

100 % of the information left out were of the ventilation, blood gases, drips and inotropes of patients. This could be due to continuous changing of the ventilator setting, recurrent repetitions of blood gases which sometimes can be hourly in the Critically ill, and the dynamic and ever changing dose of inotropic adjustments.

CONCLUSIONS

Our review demonstrated that a critical care chart can be useful in the emergency department setting treating patients within the red zone itself when there is a limitation in finding a facility or limitation of space, staffing and supplies to create a ED-ICU model. However further initiatives are needed to make the critical care chart more emergency friendly, reducing clutter, incorporating other levels of staff completing the sections of ventilator, blood gases and inotropic support and setting up of policies to ensure compliance to charting.

REFERENCES

1. Brailsford, S.C., Lattimer, V.A., Tarnaras, P. and Turnbull, J.C., 2004. Emergency and on-demand health care: modelling a large complex system. *Journal of the Operational Research Society*, 55(1), pp.34-42.
2. Nadarajan, G.D., Omar, E., Abella, B.S., Hoe, P.S., Do Shin, S., Ma, M.H.M. and Ong, M.E.H., 2020. A conceptual framework for Emergency department design in a pandemic. *Scandinavian journal of trauma, resuscitation and emergency medicine*, 28(1), pp.1-13.
3. Christian, M.D., Hawryluck, L., Wax, R.S., Cook, T., Lazar, N.M., Herridge, M.S., Muller, M.P., Gowans, D.R., Fortier, W. and Burkle, F.M., 2006. Development of a triage protocol for critical care during an influenza pandemic. *Cmaj*, 175(11), pp.1377-1381.
4. Keegan, A.D., 2010. Hospital bed occupancy: more than queuing for a bed. *Medical Journal of Australia*, 193(5), pp.291-293.
5. Jayaprakash, N., Pflaum-Carlson, J., Gardner-Gray, J., Hurst, G., Coba, V., Kinni, H. and Deledda, J., 2020. Critical care delivery solutions in the emergency department: evolving models in caring for ICU boarders. *Annals of emergency medicine*, 76(6), pp.709-716.
6. Gardner, R.M., Clemmer, T.P., Evans, R.S. and Mark, R.G., 2014. Patient monitoring systems. In *Biomedical Informatics* (pp. 561-591). Springer, London.
7. Okuda, Y., Bryson, E.O., DeMaria Jr, S., Jacobson, L., Quinones, J., Shen, B. and Levine, A.I., 2009. The utility of simulation in medical education: what is the evidence?. *Mount Sinai Journal of Medicine: A Journal of Translational and Personalized Medicine: A Journal of Translational and Personalized Medicine*, 76(4), pp.330-343.
8. Fordyce, J., Blank, F.S., Pekow, P., Smithline, H.A., Ritter, G., Gehlbach, S., Benjamin, E. and Henneman, P.L., 2003. Errors in a busy emergency department. *Annals of emergency medicine*, 42(3), pp.324-333.