Competencies of Nurses in Crisis Response

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Abstract

Nurses are always prompted in crisis situations that need to be acted upon. Clinical decision making and assessment skills are pillars of rapid response afferent limb. The ability of the nurse to recognize signs of clinical deterioration and to arrive with sound clinical judgement promptly is considered cornerstone to activate RRT (rapid response team) and attain positive patient outcome. This study utilized both quantitative and qualitative method. The data generated in this study suggest that senior nurses have showed confidence and ability to detect signs of clinical deterioration that empower them to activate RRT when needed. Whereas junior nurses usually confirm clinical assessments with senior nurses before deciding to activate RRT and intervening. Nurses in the study used both intuitive and analytical decision-making model. Nurses' clinical acumen, emotional responses, and impact and influence of RRT are the identified themes. Knowledge of the criteria is considered as one of the triggers to act and activate RRT.Albeit clear institutional guidelines and well-defined criteria abridge process of decision making and determine immediate action; hence, increases positive patient outcome. Enhanced RRT pathway combines patient relative participation, incorporation of MEWS in the activation criteria, and curtailing the pathway of reaching the responsible physician.

Keywords: Nurse, Clinical Decision Making, Nurse Decision Making, Rapid Response Team

1. INTRODUCTION

Nurses are always prompted into situations wherein their decision-making skill is often challenged. Nurses are considered as key decision makers in healthcare team. Hence, sound judgement and quick decision making has to be made particularly in situations between life and death. As defined, "Clinical decision-making is a complex process involving observation, information processing, critical thinking, evaluating evidence, applying relevant knowledge, problem solving skills, reflection and clinical judgement to select the best course of action which optimizes a patient's health and minimizes any potential harm" (Standing, 2010).

Due to the overwhelming clinical challenges, Rapid Response Teams or Rapid Response Systems were introduced to the hospitals. Activating RRT helps nurses manage patient in crisis outside ICU, however, careful analysis of patient condition before the decision to activate has to be undertaken. Rapid response system is believed to provide early detection and management of clinical deteriorations for patients in general units (Danesh, 2019). However, perceptions and clinical experiences of ward nurses and physicians, monitoring technology and criteria for activation affect the process (Chua et al., 2017). Length of experience is also related in the reluctance of nurses to activate RRT (Jackson, 2016).

In a study conducted by Maharaj, RRS teams aid in reducing hospital mortality and cardiac arrest. Despite the introduction of RRT in many institutions, its implementation and team composition vary (Maharaj, 2015). In addition, gaps for implementation have been identified and frequent education with emphasis on RRT process is found to be an effective key to increase rates of activation (Astroth, 2016).

Health care providers often claim delay in activation of RRT which contributes to poor patient outcome and increase in patient mortality. More often than not, nurses receive the blame of the delay or failure to activate RRT. King Fahad Hospital is a tertiary referring hospital in Madina Al Munawarah, Kingdom of Saudi Arabia which isalso known as the trauma center in the province. Due to the increasing rates of code blue and heightened regard with patient safety secondary to institution accreditation, Rapid Response Team is introduced in 2015.

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A policy was coined; nonetheless, its full implementation is hindered due to several issues concerning the team composition and process. In 2017, as the hospital applied for international and localre-accreditation, its implementation has been pursued on which adherence and competence was an issue. Activation was not frequent and code blue activation was still high.

1.1. OBJECTIVES OF THE STUDY

The study aimed to identify competence of nurses in crisis response in terms of conducting clinical assessment and decision-making model used by nurses inactivating the RRT; determine the factors that affect the nurses' decision to activate RRT; determine the reason of referrals in different areas/ units; determine the impact of RRT; and design or enhance current RRT protocol.

2. LITERATURE REVIEW

To explore the topic about Rapid Response Team and Nurses Decision-making, an extensive review of literature was performed. Databases such as CINAHL, PubMed, MEDLINE, and Google scholar have been searched for relevant literatures. Keywords used in the literature search are clinical decision making, nurse decision making, Rapid Response Team, rapid response systems, and Medical Emergency Team. Searched was narrowed to literatures published from 2010 to present however, there were few literatures found related to clinical decision making thus, limiters were expanded.

Rapid Response Team, Rapid Response Systems, and Medical Emergency teams were often used interchangeably. Rapid response teams are designed to detect critical deterioration of patient's status in areas outside ICU, activate alert, and provide immediate response by formed group of health care professionals (DeVita, 2017; Danesh, 2019). In 2013, Winters had enumerated three (3) components of RRS that include the afferent limb, efferent limb, the administrative and quality improvement limbs. Almost similar to that, RRT was described to consist four limbs by DeVita. These are afferent limbs, efferent limb, administrative limb, and lastly quality improvement limb (Devita, 2017).

The use of RRT has contributed to meaningful outcomes. It reduced mortality and cardiopulmonary arrest (Maharaj, 2015; Jones, 2016). Despite the aforementioned claim, it still remains controversial (Lyons, 2018). In addition, outcome depends on factors affecting the afferent and efferent limbs. Its success is dependent on timely identification of patient status deterioration and immediate activation of the team (Jackson, 2017).

Nurses play an important role in observing and clinical decision making. Nurses decide using available evidence. Nurses are usually prompted to make significant decision in clinical setting. In fact, nurses need good clinical judgement starting from which interventions would fit until the interpretation of cues presented by the patient. Clinical decision making is a fundamental aspect of nurses' clinical practice and has a direct impact on the health and well-being of each patient (Krishnan, 2018).

There are different factors that affect clinical decision-making. In a literature review conducted by Muntean, decision-making is based on cue recognition which is purely grounded on knowledge acquired in school and augmented with clinical practice (Muntean, 2012). Nurse's experience and other factors such as confidence, intuition, and use of protocols, organization and unit culture, education, understanding of patient status, situation awareness, and autonomy in nursing practice is found to play quintessential role in nurses' decision-making (Nibbelink, 2019).

In 2002, Lauri and Salanterä had conducted a study to develop and test a decision-making instrument for nursing. It yielded that nurses' use the analytical, analytical-intuitive, intuitive-analytical, and intuitive decision-making models. Decision-making models used diverged according to field of practice and country (Lauri & Salanterä, 2002). Bjørk and Hamilton (2011) had studied clinical decision-making of nurses in four hospitals in Norway. They found that nurses use quasi-rational models of decision making that include both analysis and intuition. In 2014, Parker studied what clinical decision-making models do medical surgical nurses use in activating RRT. He concluded that nurses with higher frequency of activating RRT are analytical decision makers (Parker, 2014). It is claimed that delay in its activation leads to increase mortality, admission to ICU, and longer hospitalization days (Reardon, 2018; Padilla, 2019). In a systematic review conducted by Tirkkonen et al. (2017), there is scarce data on long-term survival of patient who had been treated by RRT and data on long-term outcomes of RRT.

RRT is believed to provide immediate care for deteriorating patients (Shapiro, 2010). Activating RRT helps nurses manage patient in crisis outside ICU, however, careful analysis of patient condition before the decision to activate has to be undertaken. Similar to that, Rapid response system is thought to provide early detection and management of clinical deteriorations for patients in general units (Danesh, 2019).

To detect clinical deterioration of patients, monitoring patients are considered part of the efferent limb of RRT (Taenzer & Spence, 2019). Institutions across US and Europe had incorporated Early warning scores (EWSs) in monitoring and observation of patients wherein clinical manifestations were scored and calculated (Gerry, 2017; Ludikhuize, 2014; Parrish, 2017). Hence, in order for nurses to respond as immediate as needed, some of the institutions and researchers had put up criteria for activation apart of the process of activation.

Based on the study conducted by O'Hara (2015), RRT is activated when there are sudden and persistent changes in oxygen saturation of <90 %, HR <40 or >130 bpm, Sytolic BP <90, RR<10 or >28 bpm, conscious state that includes delirium, chest pain, and new onset of symptoms suggestive of stroke. Staff intuition such as "worried" (Tirkkonen, 2019), serious concerns however, not elucidated further (Blotsky, 2016), and not looking right (Davies, 2014) was included. On the other hand, MEWS (Modified Early Warning Score) is adapted by other hospitals that rates HR, SBP, RR, Temperature, Central Nervous System (AVPU), Oxygen saturation after intervention, and Oxygen delivery from 0-3. Likewise, zero (0) for extreme abnormally low and high signs (Parrish, 2017). Similarly, in Medscape MEWS calculator: Systolic BP (mmHg) ≤ 70 (3 points), 71 – 80 (2 points), 81-100 (1 point), 101 – 199 (0 points), ≥ 200 (2 points); HR (beats per minute) ≤ 40 (2 points), 41-50 (1 point), 51- 100 (0 points), 101-110 (1 point), 111- 129 (2 points), ≥ 130 (3 points); RR (breaths per minute) < 9 (2 points), 9-14 (0 points), 15-20 (1 point), 21-29 (2 points), ≥ 30 (3 points); Temperature <35 $^{\circ}$C (2 points), 35- 38.4 $^{\circ}$ C (0 points), ≥ 38.5 $^{\circ}$ C (1 point); and AVPU Neurological Score: Alert (0 points), Reacts to voice (1 point), Reacts to pain (2 points), Unresponsive (3 points). Interpretation has also been provided in the application which recommends that higher level of care must be considered if any physiological parameter scored 3.

Moreover, Physiological Early Warning System (PEWS) has been used in an acute medicine unit of a 1500 bed medical city in Saudi Arabia and had concluded that Critical Care Response Team (CCRT) activation in their setting was not reduced nor affects the length of hospital stay of patients. Albeit they further explained that CCRT is not affected due to overlapping between its activation and PEWS escalation algorithm (Alqahtani, 2019).

Additionally, non-ICU staff nurses are hesitant to activate RRT because physicians discourage them though the study yielded that 77 % of their respondents answered that use of MET improves patient care and that activating a call is one of the common actions (Pussateri, 2011).Perceptions and clinical experiences of ward nurses and physicians, monitoring technology and criteria for activation affect the process (Chua et al., 2017). Length of experience is also related in the reluctance of nurses to activate RRT (Jackson, 2016). Expertise of RRT members and support from colleagues and leaders are found to facilitate RRT activation (Astroth et al, 2013). In addition, worthy clinical background, knowledge and communication skills of nurses are considered essential to immediately address the needs of critically ill patient (Alshehri, 2015).

In 2017, Gupta et al. investigated the impact of delayed activation of RRT on Hospital mortality. There were 826 RRT calls happened in 629 admissions wherein a quarter were delayed to more than 15 minutes. They concluded that "delay is associated with increased in-hospital mortality and longer hospitalization." (Gupta et al, 2017). Dubozinsky (2019), posited that detection of clinical deterioration, delivering report to RRT, and collaborating with the RRT are the roles and responsibilities of bedside nurse.

Moreover, RRS implementation and team composition vary from one institution to another (Maharaj, 2015). Gaps for implementation have been identified and frequent education with emphasis on RRT process is found to be an effective key to increase rates of activation (Astroth, 2017). Familiarity, agreement and perceived RRS benefit of its criteria correlates to higher rate of activation (Davies, 2014). A well implemented RRT is equated to reduced mortality and death of patients outside ICU setting (Stoldorf, 2016; Solomon, 2016).

Supportive, collaborative organization focused on a culture of safety, dynamic interdisciplinary relationships, and high-quality educational effortsare essential in removing the barriers that impede the nurse's recognition and activation of a rapid response team for a deteriorating patient(Clayton, 2019). Whereas, effective RRT performance relies on organizational culture, team structure, expertise, communication, and teamwork (Leach, 2013).

3. METHODS

3.1. Research Design

Both quantitative and qualitative research designswere utilized in this study. (Polit, 2017). First, quantitative, descriptive methodology through retrospective review of RRT reports, review of competency evaluation results, and use of a survey questionnaire. Second, Qualitative methodology was used to uncover the factors that affect the nurses' decision to activate rapid response team and support the data gathered primarily in quantitative phase.

3.2. Setting and Participants

This study wasconducted in King Fahad Hospital in Medina City, Saudi Arabia. It is a 500-bed capacity tertiary hospital catering wide variety of medical-surgical services.

The institution had implemented the policy of rapid response team in accordance with the MOH guidelines and JCI standard COP 3.1. which states that clinical staff are trained to recognize and respond to changes in a patient's condition (2014). The criteria for RRT activation are: Acute changes in Heart rate <40 and > 10 bpm, systolic BP <90mmHg and > 180 mmHg, RR <8 or > 28 per minute, O_2 saturation of less than 90% despite oxygen, acute change in conscious state, chest pain unrelieved by nitroglycerin, urine output <50ml in 4 hours, threatened airway, and seizure (status epilepticus).

In the period between March 2019 to May 2020, there were three hundred thirty-three (333) activations attended by Rapid Response Team. Among the report, one hundred ten (110) activations were made by nurses and 85 nurses had their names recorded in the RRT report. Due to repeated activations, some nurses had their names entered multiple times and only sixty-one (61) nurses were identified as potential respondents.Fifty (50) nurses had responded to answer the questionnaires and ten (10) nurses were interviewed individually for the qualitative phaseby running simple random sampling through the list of nurses who had activated the RRT.

In both data sets, majority of the respondents were female nurses. Their ages fall between 30 to 39 years old (66 %) and were dominated by staff nurses with BSN degree (66 %). Most of the respondents in the survey questionnaire had 6 to 10 years of experience (46 %) while in interview phase were having 11 to 15 years of experience (60%).

Participants for the quantitative phase were from medical unit (34 %), General surgery (12 %), Urology unit receiving mixed cases in the recent period, Orthopedic unit, and Isolation unit (8 %), Neurosurgical unit (6 %), and OPD/ KAKC (2 %). While the informants for qualitative phase are from Medical unit (30 %), Urology unit (20 %), and 10 % respectively for General surgery, Kidney Transplant converted to Isolation unit in the first quarter of 2020, Orthopedic, and Neurosurgical unit.Medical Ward staff represented largest number of participants in both phase, 34 % and 30 % respectively.

3.3.   Instrument Tool

A self-report questionnaire and a semi structured interview were applied in this study. The questionnaire included the demographic data of participants, the 24-item Nursing Decision Making Instrument (SannaSalanterä, Professor of Clinical Nursing Science, Department of Nursing Science, University of Turku), and the author-designed questions.A semi structured interview was carried out to gather qualitative data (See attachment for the topic guide).

3.4.   Data Collection Procedures

3.4.1. Quantitative Phase

The first phase of data gathering is collected through retrospective review of the RRT reports of the institution wherein frequency, prevalence, indication of RRT activation, and activating staff nurses were accumulated. Review of reports started after the IRB approval was secured. RRT reports from March 2019 to May 2020 were checked. Furthermore, activating nurses were reached out as research respondents and provided with the research questionnaire.

The 333 RRT reports were reviewed which showed 152 of which were discovered by nurses and the rest were by physicians, Radiologist, and patient watcher while 42 were undocumented. Out of 333 RRT activations, 110 were activated by nurses. 85 of them had their names recorded and some had activated repeatedly; hence, 67 nurses were identified. However, six (6) of them had left the institution already hence there were 61 possible respondents for the study.In addition, recorded competency evaluation of staff was reviewed to check their knowledge, skills, and attitude regarding assessment and re-assessment of patients and RRT (Rapid response team).

Survey Questionnaires were distributed to all the identified respondents were reached however, some of them were on vacation and sick leave and response was not elicited. There were 41 initial responses thus, snowball sampling was used to gather additional data resulting to 50 survey response.Questionnaires were distributed in the midst of August. Responses were collected immediately until last week of September 2020.
Data collection was affected greatly by shifting duties of respondents, annual vacation/ leaves, sick leavesi.e., quarantine, and the pandemic precautions.

3.4.2.   Qualitative Phase

Names of activating nurses weresubjected through simple random sampling to identify participants for the interview.Seven (7) participants were initially selected by randomizing participants' names in excel sheet; however, three (3) refused to participate after initial agreement. The first two (2) claimed they were busy with their mundane activities and one (1) was due to workload and other commitments. Moreover,purposive convenient sampling was performed to complete the needed data.

Data gathering started after thorough explanation about the research ethical considerations to the participants and securing their consent. A total of 10 nurses who activated RRT were interviewed which took place from September 2020 to October 2020.

3.5.   Data Analysis

Data were coded and entered by using Statistical Package for Sciences (SPSS 26). A descriptive statistic was used to analyze the data obtained from the participants about their demographic information (age, gender, nationality, education background, years of experience, work of place). Appropriate statistical tool was utilized to analyze the survey results.

Nursing Decision-making Instrument developed by Lauri and Salantera (2002) was used to analyze the decision-making models utilized by nurses. The decision model was interpreted according to the sum total of the scores. Nurses scoring less than 67 points were analytically oriented, 68 to 78 points were flexible. Nurses are deciding analytically and based on their intuition depending on to the situation. Intuitive decision-making scores more than 78 points (Lauri &Salantera, 2002).

Recorded interviews were transcribed verbatim and were given back to the respondents to validate the data and increase its reliability. To analyze the qualitative data, content was reviewed thoroughly, coded, and analyzed to arrive to thematic categories (Polit, 2017; Braun &Clarke,2012).

3.6.   Ethical Consideration

An approval from the research instrument proponent, nursing school, and nursing administration, research ethical committee and institutional review board (IRB) at King Fahad Hospital is elicited. Nurses who participated in this research received an explanation of the purpose of this study and were informed that they have the right to choose not to complete and to withdraw from the study if they decide to. In addition, nurses involved in this study were provided with an official consent and the anonymity and confidentiality were ensured for all the participants.

Since this study deals with human subjects, the researcher has presented a certificate of "Protecting Human Research Participants Online Training" which was also required by the IRB for its approval.

4.   RESULTS AND DISCUSSION

The findings of this study show the quantitative and qualitative data results. The results are integrated and presented in accordance with the research questions. Qualitative responses were analyzed;hence, themes are coined namely: nurses clinical acumen, emotional responses, and impact and influence of RRT. Nurses' clinical acumen consists of subcategories such as knowledge of RRT, assessment and recognition of clinical deterioration, initial response, and triggers and pacifiers in activation of RRT.

Table 1.1
Clinical Assessment on RRT

Items	Yes		No	
	f	%	f	%
1. I know what is Rapid Response Team.	50	100.00		
2. I know the indications when to activate RRT	50	100.00		
3. I will activate RRT when the Heart rate is < 40 or > 130 bpm.	47	94.00	3	6.00
4. I will activate RRT when the Systolic BP is < 90 mmHg and > 180 mmHg.	47	94.00	3	6.00
5. I will activate RRT if RR is < 8 or > 28 per minute.	46	92.00	4	8.00
6. I will not activate RRT if saturation is more than 90.	46	92.00	4	8.00
7. I will not activate RRT if there is an acute change in consciousness	13	26.00	37	74.00
8. I will activate if there is an acute change in urine output	45	90.00	5	10.00
9. I will activate if chest pain is unrelieved by nitrolycerin.	47	94.00	3	6.00
10. I will not activate if airway is threatened.	10	20.00	40	80.00
11. I will activate if patient is having status epilepticus/ seizure.	47	94.00	3	6.00
12. I do not know how to activate the RRT	5	10.00	45	90.00
13. I know when to activate RRT if pediatric patients starts to deteriorate.	47	94.00	3	6.00
14. I conduct assessment and history taking and utilize its result to plan my action.	48	96.00	2	4.00
15. I interpret obtained data from assessment and monitoring equipment before activating RRT.	50	100.00		
16. It will take me time to recognize signs of clinical deterioration.	7	14.00	43	86.00
17. I apply appropriate management in response to physiologic changes before activating the RRT.	48	96.00	2	4.00
18. I know how to recognize and manage possible complications.	50	100.00		
19. I know how to detect clinical deterioration for pediatric patients.	46	92.00	4	8.00

Table 1.1 shows the knowledge and clinical assessment of Nurses on Rapid Response. All the respondents have claimed that they know what RRT is and they are knowledgeable about the indication of RRT activation. All of them are interpreting the assessment data they have obtained before they are activating RRT. Further, 100 % of them has affirmed that they know how to recognize and manage possible complications. Meanwhile, 96 % of the respondents applyappropriate management in response to physiologic changes before activating the RRT and conductassessment and history taking and utilize its result to their plan of action.

Moreover, 94 % of them reported that they have to activate RRT when their patient has heart rate of less than 40 and more than 130 bpm, has systolic Blood Pressure of less than 90 mmHg and more than 180 mmHg, has chest pain which is unrelieved by nitroglycerin, and if their patient is manifesting signs of status epilepticus or seizure. In addition, 92 % of the respondents affirmed that they will activate rapid response team if their patients' respiratory rate is less than 8 or more than 28 per minute, and they will not activate if the saturation is more than 90 %. Similarly, 92 % knows how to detect clinical deterioration for pediatric patients and 8 % had claimed otherwise.

Out of 50 respondents, 74 % answered no in the questions that they will not activate if there is an acute change in level of consciousness, 80 % if airway is threatened, 90 % denied that they do not know how to activate RRT, and 86 % reputed that it will take time for them to recognize signs of clinical deterioration for their patients. As part of the nurses' clinical acumen, knowledge and understanding of RRT including reliability of clinical manifestations are salient part of the afferent limb of RRT.

The above findings are supported by the qualitative results showing that staff has common understanding about rapid response team. "*It's a good system to ahh… protect the patient to reach to cardiac and pulmonary arrest. It is helping the patient and the staff and improve the patient health to be ok. And it decreases the rate of cardiopulmonary arrest*", "*…team ready for the deterioration of patient. To improve patient case prior code blue and we want to limit patient admission or the transfer to ICU…*", "[Activated] *before patient yaani*[Arabic word for 'means']*before to activate the code blue This is to confirm or control the code blue*" are among the responses.

One of the participants also stated,"*It means the activation for medical or response if the patient is what is as assess or during something …happens … we are going to activate RRT to prevent from deterioration or any further incident that may cause harm to the patient*". "*Any patient deteriorating case and needs urgent intervention and that's the time we are calling the team to intervene.*"

These responses conform with the definition that Rapid response teams are designed to detect critical deterioration of patient's status in areas outside ICU, activate alert, and provide immediate response by formed group of health care professionals (DeVita, 2017; Danesh, 2019).

Nurses also demonstrated knowledge on the process of activation of RRT. Their initial responses to deteriorating patient were elicited. All of the nurses interviewed had acknowledged that assessment and validation of their data are essential. "*We are checking the patient. We are making sure that everything is accurate. The reading is accurate. We are making sure that the reading we have are correct.*", "*Patient is not stable, so you have to check the patient.*", "[Patient is deteriorating] *according to vital signs. We are monitoring the patient physically. Seeing the patient, patient complain, patient informing us. "I have chest pain; I have problem". Patient not feeling well. And nursing observation also.*"

Taenzer and Spence (2019), Devita (2017), and Winter (2013) addressed assessment and response as the afferent limb of RRT whereas termed as detection arm by Lyons (2018).In fact, continuous monitoring of patients in general units is advocated as it allows immediate notification and action of nurses and thereby could lead to reduction of RRT activations (Taenzer & Spence, 2019).This action would be a great help to non-ICU nurses as an adjunct to their assessment data however, it is not widely adopted due to variety of reasons such as increase hospital cost.

Table 1.2.

Staff with Assessment and re-assessment and RRT competency evaluation

Year	Number of Staff	Assessment and Re-assessment	RRT competency
2018	823	418	599
2019	847	219	219
2020	902	693	510

Table 1.2.represents the number of staff who had undergone competency evaluation regarding assessment and re-assessment and competency for RRT. With the in-depth review of staff with competency evaluation, all new staff completed both competencies for assessment and re-assessment as it is part of their mandatory competencies and had received lectures including those topics in their orientation whereas old staff reviews the institution policy prior to their evaluation. Staffs were evaluated according to knowledge, skills, and attitude. The number of staff who completed both competencies fluctuated from 2018 to 2020.Large number of staff showed acceptable level of competence at the time of evaluation however, new staff needs constant exposure to master the skill.The data support the verbal response of the participants during the interview. Competency evaluation that is performed annually including those topics help staff improve their confidence, knowledge, and skills to deal with clinical changes in patient status and respond abruptly in crisis situations. Nevertheless, some staff had not completed the competency evaluation due to their vacations and some with reluctance to comply.

Table 2Decision Making Model Used by Nurses in Activating RRT

Decision – Making Model	Frequency	Percentage (%)	Holistic Interpretation
Analytical	5	10.00	Low
Flexible	45	90.00	Moderate

< 67 points = Analytically oriented decision making; 68 – 78 points = Flexible decision making; > 78 points = Intuitively oriented decision making

Table 2 shows the decision-making model used by nurses in activating RRT. Majority of the nurses useboth analytical and intuitive oriented decision-making model.

This result agrees with the findings of Bjork and Hamilton in 2014 that nurses have the propensity of using analytical and intuitive decision-making model according to the situation. On the contrary, medical surgical nurses use analytical decision-making model in activation of RRT (Parker, 2014).Moreover, the result of this study is further supported by Krishnan (2018) that due to the dynamic working environment of nurses, decision making used is neither completely analytical nor intuitive.

Although there are different decision-making models available in the literatures, clinical roles, work environment, and how nurses perceive themselves as key decision makers are related to the frequency and types of decisions that nurses make and usually encounter (Thompson, 2004). Decision making employed by nurses are actually complex and still needing further studies (Muntean, 2012; Bjork & Hamilton, 2011; Nibbelink& Brewer, 2018).

As part of the clinical acumen, availability of criteria makes it easier for the nurses to arrive at a decision.Familiarity with the process yields to increase RRT activation (Davies, 2014).

Table 3

Factors that Affect the Nurses Decision to Activate RRT

Based on your experience, how many times have you activated RRT?	Frequency	Percentage (%)
less than 2 times	14	28.00
3 – 4 times	19	38.00
More than 5 times	17	34.00
Response when you detected the clinical signs of deterioration in your patient status		
checked my patient's vital signs	48	25.80
ask my colleague to assess my patient	30	16.10
called the treating team (Primary physician)	39	21.00
informed my charge nurse/ Head nurse	36	19.40
immediately activated RRT	27	14.50
Others	6	3.20
What prompted you to call RRT?		
My patient is showing one of the criteria to activate RRT	45	22.10
I believed that RRT brings help more quickly	29	14.20
The physician directed me to	25	12.30
l believed that RRT decreases code blue	32	15.70
I was asked or encouraged by my nursing colleague to activate RRT	9	4.40
l believed that RRT can provide the care needed for my patient	37	18.10
I see that RRT benefits my patient.	26	12.70
Others	1	0.50
What hinders you in activating RRT?		
I think I can manage my patient we	18	19.10
I believe that the primary team should be called first before activating RR	20	21.30
I do not know the criteria in activating RRT	7	7.40
I do not know how to activate RRT	7	7.40
Activating RRT only increases my workload	7	7.40
I am afraid that ICU nurses on the RRT will think that activation is unnecessary	13	13.0
I am afraid that the primary team will scold me if I activated RRT without calling him first.	15	16.00
Others	7	7.40

Table 3 shows the factors that affect the nurses' decision to activate RRT. Majority of the nurses had activated RRT more than 2 times; accounting to 38 % have experienced 3 to 4 times, and 34 % of them had activated more than 5 times. As per response to their patients' clinical deterioration, 48 of the respondents are

checking the patient's vital signs, followed by 39 calling the treating team (primary team), and 36 responses for informing their charge nurses. Thirty (30) had responded that they will ask their colleague to assess their patient while 27 considered activating RRT as their response and six(6)had pointed additional actions they are performing when they detected signs of deterioration. These include two (2) respondents who had answered informing MROD/ on call physician, one (1) to check the RBS, one (1) to perform assessment to check for other related clinical signs, one (1) considered positioning the patient and applying oxygen therapy, and lastly, to review medications that the patient had taken.

Among the options on what prompt nurses to call RRT,nurses are mostly prompted to call RRT if their patients are showing one of the criteria to activate RRT (22 %), 18 % because of they believe that RRT can provide the needed care for their patient, and 15 % is due to their belief that RRT decreases code blue. The fourth reason is that nurses believed that RRT brings help more quickly (14 %), they believed that it benefits their patients (12.7 %), and 12.3 % because they are directed by the physicians.

Few have selected that they were asked or encouraged by their colleagues (4.4 %) while 0.5 % are prompted because of their belief that RRT lessens ICU admission.Activation of RRT is found to be hindered by the following reasons: 21 % believed that the primary team should be called first before activating RRT and 19 % thought that they can manage their patients. Some reported that they are afraid that the primary team would scold them if they activated RRT without calling them first (16 %). Other reasons are:they are afraid that ICU nurses on the RRT will think that activation is unnecessary (13 %), 7.4 % does not know the criteria, not familiar on how to activate, and believe that RRT increases their workload. Meanwhile, 7.4 % answered that signs that are not included in the criteria for activation hinders them to activate RRT and few have answered that nothing stops them to activate.

Triggers and pacifiers in activating RRT are among the identified themes in the qualitative findings. The triggers were the participant's verbal reports about presence and accessibility of criteria and guidelines, availability of senior nurses when help is summoned, patient condition and time constraint, when primary team is not answering, and also as directed by the primary treating physician. As narrated by one of the participants, "*Usually according to the patient situation. If the patient is in crisis we can call. If there is no choice to call the medical or somebody or there is no time, we can call the RRT by nurses itself. If after the second opinion of our charge nurses or somebody who is with us.*".

Other participants also said, "*We have to check first if in the guidelines. For observing the patient. You know that there is [are] abnormalities, you have to check all complete vital signs it is in the machine. So that is why we have guidelines to call the RRT so that we can activate.*", "*…according to the policy. There is aset criterion for it that we have to follow.*"

The pacifiers in activating RRT found and supported by the participant's verbal reportsare: nurses and physicians view that they can manage the situation, known medical condition of patient i.e. hypertension, presence of DNR order, workload, and limited knowledge of junior staff to activate RRT, afraid of the reaction of the RRT team. However, nurses who worked in units that are supportive to RRT and colleaguesdo not perceive the negative attitudes of RRT members as barrier (Astroth, 2016).

One of the respondents revealed that, "*They [junior colleagues] are… not all know how to activate. They are asking help to activate. They are asking how to activate. Some of the new, they are asking what is RRT. How to do like this. Not all they know perfectly.*" She also added, "*they [physicians] are not activating immediate. They [physicians] think they can solve the problem by themselves. No need to activate.*".Another participant divulged that, "*…work overload. Like usually. We are already overload with work. If we activate the RRT that means more work.*" He also added, "*They [colleagues] will try to call the team to treat the issue before activating the RRT even they meet the criteria.*"

Workload related to activation of RRT is viewed by some nurses to have some negative implications. Nurses choose not to activate due to increase workload. This finding is opposed to the result found by Benin in 2013 that RRT activation facilitates redistribution of workload for nurses. They found that RRT allows nurses to realign their tasks and ensure that the rest of the patients are attended (Benin, 2013).

Patient's known medical condition and DNR also served as pacifier in activating RRT. "*His [patient] RR, his [patient] Heart Rate more than 130. If the patient is stable. The patient looks stable it is like that. I will asked the nurse, cardiac patient or sometimes the patient came with high blood BP. And you saw the reading in front of you is high. That mean for you the patient is stable. That main problem came from this one. He came to you… he came for this one* [hypertension] *you cannot activate yaani* [Arabic word for 'means']. *His BP always 220 over 120 like that.*" Another participant reported, "*Even under the criteria of RRT, we can recheck also. Because according to patient condition or maybe patient is hypertensive or alatool*[Arabic word used interchangeably means 'known' or 'continuously'] *hypertensive. It will be. We are not considering for the RRT.*" "*According to the DNR form. Sometimes the RRT or the Code blue is checked yes or no. If yes, I will activate. If no, I will not activate.*", "*They [*the physician*] are asking not to activate anything.*"

In the setting where this study is conducted, persistent hypertension is not included in the criteria and management remains with primary treating team. In the study of Blotsky (2016), RRT can be activated when systolic blood pressure (SBP) is more than 200 mmHg nevertheless, presence of a known disease is not discussed. As opposed to that, high blood pressure is excluded in the criteria yet sudden and persistent change in SBP of 90 mmHg and below is placed as RRT trigger (O'Horo, 2015).

Emotional reactions are also noted which can also be considered as factors in responding to crisis and activating RRT. Hopelessness or feeling of neither empowered nor heard, doubt, confidence, fear of getting blamed or accused of activating RRT by mistake, stressed, and shocked are among the emotional reactions of nurses in responding in crisis.

The participants recounted "*Because the physician he knows, so we cannot activate from ourselves. We should take order from them. So, if he thinks he can solve the problem. We will just follow the order and we will instruct him it is better to activate RRT. We are telling them our experience we are facing like this problem and we with RRT. The problem will be solved immediately or better…we are giving suggestion to the physician.*"

The respondent also added, "*No, it is not* [ok] *because our experience should be respected. Because already we faced.*" "*[has found one or 2 signs from criteria] Sometimes, if the doctor is there. I am telling discussing with the doctor. If this one need RRT or not. Baden [arabic term for then] he will decide that one. After that we will.*"

Moreover, a respondent also related that, "*If you have any doubt if any doubt, we will check our policy in the system.*" Other nurses especially senior nurses display confidence as they are equipped with knowledge and experience. "*If we don't have the time to call this one like immediate ahhh sudden, we have the attention means we call the RRT by the nurse.*", "*No! I did not hesitate because actually I was, there is significant change at the patient status.*"

Staff are being condemned for activating RRT at times. The respondents relayed that, "*The RRT said it is not RRT case. 'Why you activated?'*","*… someone will tell you why you activate? Really for me I am not activating but if they have sign, I will activate because I know… what I am doing with the patient is right* [changed in facial expression]." A responder also narrated that the team is rude to the staff, "*Sometimes, we encounter a team that rudely will tell us this is not RRT case or anything so that also puts stress on the staff when we are call for RRT.*"

In addition, junior nurses are shocked and feel overwhelmed with the situation. "*I was… shocked with what happened but I still managed the patient to be keep calm and checked the patient properly if he is still responding and then so far what we had done initially to prevent further deterioration.*"

Moreover, staff have also revealed during the interview about unexpected events, though rare, yet need to be addressed. These include the need for an alternative line to activate i.e. number to call just in case activation was not picked up and to put up another team just in case of two or more activations in a matter of minutes. Nurses had verbalized need for education and increase awareness regarding roles especially on bedside nurses.

Table 4.1.displays the number of RRT referrals across the hospital with the roster of discoverers and activators. There are a total of 333 RRT activation referred from various units in the hospital. Most of the referrals or activation were discovered by Nurses followed by physicians, Respiratory therapist, Radiologist, and patient watcher; forty-three (43) were undocumented.

As Dobuzinsky posited in 2019 that one of the prime roles of nurses is to detect deterioration of patient through surveillance and monitoring prior to emergency call, the result that the number of physicians discovering the indication to activate RRT is unexpected. The involvement of patient and relative in afferent limb of RRT is not further studied; however, in the study published by McColl and Pessata in 2016, patient's family (watcher) is classified as General clinical criteria in activating RRT.

Table 4.1.

Frequency of RRT activation and Unit of referrals (n=333)

Discoverer	Frequency	Percentage (%)
Nurse	152	45.60
Physician	134	40.20
Radiology	1	0.30
RT	3	0.90
Watcher	1	0.30
Not Documented/ Specified	42	12.60
Activator		
Nurse	110	33.00
Physician	111	33.30
Radiology	1	0.30
RT	2	0.60
Not Documented/ Specified	109	32.70
Unit		
AKU	1	0.30
AKU ICU	1	0.30
Burn	2	0.60
CT	1	0.30
Endoscopy	1	0.30
Hematology and oncology	25	7.50
IMCU	47	14.10
Isolation	20	6.00
Medical	133	39.90
Neuro	18	5.40
OPD	1	0.30
Ortho	31	9.30
Surgery	37	11.10
Urology	15	4.50

In terms of the activators, 110 reports have been activated by nurses, 111 by physicians, one (1) by Radiologist, and two (2) by respiratory therapist. Further,109RRT reports have undocumented activator. Albeit activation of by nurses is outstripped by physicians, the difference is not significant and nurses'incompetence to activate cannot be concluded. The result is suggestive that the institution guideline to activate has a direct effect in higher number of activations made by the physicians.

The above is supported by participant's narration that "… *The … our GS they came direct when we called. They examined the patient, so they say RRT and when they started with patient oxygenation.*"and"*We have guidelines we call RRT like Heart beat about and below 40 the RR above 40 and below 8 for example… not to call RRT immediately but you have to inform the doctor. If the doctor is not coming, then we can call the RRT.*"

The above finding supports the suggestion of O'Horo et al. (2014) that the primary team involvement contributed todiscussions of goals and had emphasized that "RRT role is not a substitute but an adjunct for an engaged and present primary treating team." However, there is a scarce literature regarding physician's role as activators for RRT.

Table 4.1. also shows that majority of the referrals made are from medical wards (39.9 %), followed by IMCU (14.1 %), Surgical units (11.1 %), Orthopedic units (9.3 %), Hematology and oncology unit (7.5 %), Neurosurgery (5.4 %), Urology (4.5 %), Burn Unit (0.6 %), and AKU, AKU ICU, CT Department, OPD, and Endoscopy have referred or activated RRT once respectively (0.3 %).

Table 4.2

Reasons of Referrals

	Yes		No	
	f	%	f	%
1. RR	138	41.40	195	58.60
2. HR	108	32.40	225	67.60
3. SPO$_2$	158	47.40	175	52.60
4. Neurologic	167	50.20	166	49.80
5. BP	112	33.60	221	66.40
6. Chest Pain	5	1.50	328	98.50
7. Fluid Status	9	2.70	324	97.30
8. Seizure	3	0.90	330	99.10
9. Not in Criteria	14	4.20	319	95.80
10. Not recorded	19	5.70	314	94.30

Table 4.2. shows the reasons of referral or RRT activation. The most common cause of activation or referral to RRT was neurologic related signs such as decrease level of consciousness (50.2 %) of the total recorded RRT activations (n=333). The second reason is SPO$_2$ related issues mainly hypoxia (47.4 %) followed by Respiratory rate (bradypnea and tachypnea) which accounts to 41.4 % of the total referral. In addition, blood pressure-related issues like hypotension and hypertension and Heart rate related abnormality (bradycardia and Tachycardia) are also included in the five (5) most common causes of activation. Chest pain, fluid status of patient such as decrease in urine output to less than 50 ml in four (4) hours, and seizure were also enumerated as the causes of activated but contribute with the least number of referrals. Moreover, 4.2 % of the n=333 were activated without conferring with the RRT activation criteria set by the institution. On the other hand, 5.7 % of the reports have no recorded indication for activation.

These findings are validated by the respondents' statements that hypoxia, hypotension, bradycardia, decreased level of consciousness, convulsions, and decrease urine output are the common reasons why they are calling for RRT. "*The patient is conscious oriented and the GCS 15/15 and suddenly deteriorating the level of consciousness.*", "*We activate RRT for low Blood pressure, sometime low saturation…*", "*…have shortness of breathing. SPO2 less than 90 %- 88 %.*", "*I checked the patient. All of a sudden, he collapsed. I checked the Blood pressure. Level of consciousness dropping severely and on top of that. The urine output was minimum, so I activated the RRT at that time.*"

In addition, one of the participants shared this experience: "*The patient was…[trying to recall] has low GCS that time. I think it was 13/15 then he was already long time in the ward maybe more than 10… 5 to 10 days like that. And then He was still responsive before and then during that time the GCS deteriorated. But then…what is this…During, he was connected to the dynamap monitoring. We noticed it was alarming. We seen[see] the patient. O2saturation, desaturated like that.*".

Both quantitative and qualitative findings affirmed that respiratory, neurologic like altered or decreased level of consciousness, cardiovascular issues such as hypotension,decrease urine output, and seizures are the common reasons for activation. However, respiratory distress and hypotension are the common reasons of activation of RRT in group where activation is delayed for more than one (1) hour (Reardon, 2018). Altered level of consciousness is the frequent trigger of early RRT activation (Gupta, 2017). Recognition of clinical signs of deterioration are key factors in deciding the next step that a nurse would take (Muntean, 2012; Taenzer& Spence, 2017; Danesh, 2019). Use of the Early Warning Scores is essential in determiningthe patient's risk for deterioration and serves as a tool to trigger interventions (Danesh, 2019; Jackson, 2017).

Table 5

Impact of RRT in Patient Outcome

	Frequency	Percentage (%)
It reduces mortality	46	29.10
It increases ICU admission	3	1.90
RRT reduces ICU transfers	25	15.80
It reduces code blues	43	27.20
Prompt detection of signs and immediate activation improves patient outcome	41	25.90

The results of this study show the participant's perception regarding the impact of RRT.Impact and influence of RRT is one of the themes identified from the analysis of interview transcript. Participants have observed that RRT has a great influence in the recovery of the patient. Nurses reported that patients have improved and stabilized after RRT, reduced number of admission, some came back to unit after ICU and was discharged from the facility.

As narrated by the participants "*Improve patients' outcome. The patient will take care immediately… Yeah. For the patient… he will not reach to arrest. He will not… the admission to ICU will be less. The patient will be taken care better. The outcome for the patient is better.*", "*The effect to patient. Poor [good- it is corrected by the participant after reading the transcript] prognosis to minimize deterioration.*".Another participant also stated that "*when we have RRT I observed in our ward there is decrease of CPR.*"

In addition, nurses also acknowledged that RRT helps the patient and health care workers i.e. nurses and physicians. One of the responses elicited is, "*Ahhhh… you will not wait for situation of the patient to getting worst. You are intervention directly. [tapping the table]*", He also added that, "*The more experience about critical patient make more benefit really and also support to other doctor or nurse.*"Another participant also added, "*This one RRT nurse is coming. It is very helpful for us.*" It is also narrated by another participant that, "*It is also good for us helping the patient we are also helping the ward not to toxic as they say. The team is helping us to manage the situation.*"These responses corroborate with the findings of Shapiro (2010) that nurses verbalized the relief of the RRT to hasten the process and provide specialized care.

Implementation of RRT aimed to decrease mortality. The study findings corroborate with the findings of many studies that with RRT, the rate of cardiac arrest decreases (Aitken, 2014; Jackson, 2017;Maharaj, 2015; Blotsky, 2016) and delay in activation is linked to increase mortality rates, ICU admission, and longer hospital stay (Reardon, 2018; Gupta, 2017).Conversely, early detection of patient deterioration, timely activation, and hasty action of bedside nurse greatly affect patientoutcome (Clayton, 2019). Inconsistent RRT activation also contributes to poor patient outcome (Padilla, 2018).
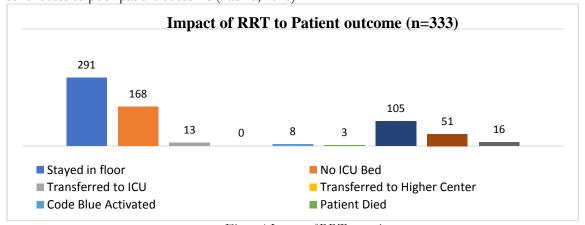

Figure 1.Impact of RRT to patient outcome

Figure 1 illustrates the number of patient according to their condition or disposition after RRT activation. Out of three-hundred thirty-three RRT activations, 317 reports have recorded patient disposition in RRT report. 291 (91.8 %) of them stayed in the floor or same unit, 168 stayed in the unit because there is no ICU bed at that period, 105 were intubated while 51 is reported to either administered high flow oxygen, non-invasive ventilation (CPAP/ BiPAP) or to define patient code status. Only 13 patients are transferred to ICU after RRT, eight (8) were reported that code blue was activated and patients died.

Based on the findings, majority of the cases treated by RRT stayed in the same unit and 57.7 % of them are due to unavailability of ICU beds in that given period. Only 4 % out of the 347 ICU admission from general units (Trans-in) were transferred to ICU immediately after RRT management.Thesefindingsclaim that unavailability of ICU bed contributes to decrease ICU transfer. However, implementation of RRT does not have a significant effect in ICU admission (Maharaj, 2015). Almost similar to the findings of Aitken in 2015 that ICU admission had increased slightly after implementation of their 2-tier RRS (Aitken, 2015).Increased ICU admissions are related to delay in RRT activation (Gupta et al., 2017). There is a limited literature regarding the number of deaths and activation of code blue after RRT activation.

In order to provide an efficient and more effective way to detect and respond to deteriorating patients in the units, data are culled and analyzed yielding to develop an enhanced RRT pathway.
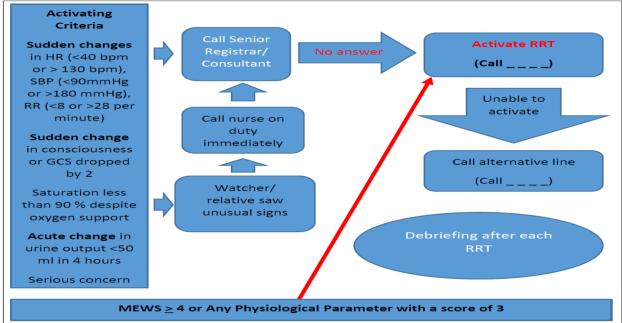

Figure 2Enhanced RRT Pathway

Based on the existing literatures and data findings of this study, the enhanced pathway has been coined (see figure 2). The pathway starts with accurate and early detection of clinical deterioration of patient and the use of MEWS (Modified Early Warning Score). The MEWS is scored every beginning of the shift (Ludikhuize et al., 2014; Gerry, 2017; Parrish, 2017; Alqahtani, 2019) and RRT is activated when the score result is equal or more than four (4) and/or if any of the parameter scores three (3) (Medscape; Parrish, 2017). Adapting MEWS increases reliability of RRT activations and provides early identification of patient deterioration (Ludikhuize et al., 2014). Serious concerns of nurses is also added to address nursing intuition (Tirkkonen, 2019; Davies, 2014). Hence, immediately calling the attention of the senior registrar or consultant for sudden changes of patient status has been considered to shorten the time from detection to management or response (Blotsky, 2016).

In addition, alternative number is added in the pathway to address instances that may arise if the activation number cannot be reached. Debriefing is also added in the pathway for improvement.

The identified limitation of this study is the non-involvement of the ICU nurses as respondents in this study and responses regarding response to deteriorating pediatric patient is not investigated. Additionally, institution only accommodates pediatric trauma in Orthopedic, surgery, ICU, and Burn unit.

5. CONCLUSION

Ability of nurses to respond in crisis situation consists of a myriad of factors. Nurses demonstrates keenness on the reliability of their assessment findings before deciding to activate RRT. Junior staff nurses were found to seek senior nurses' help in validating assessment data and decision to activate RRT. Senior nurses had demonstrated confidence in responding to crisis situation.

Despite completion of competency evaluation particularly of newly hired nurses, constant practice, application, clinical exposure and supervision of expert nurses are still required.

Nurses activating RRT utilizes both intuitive and analytical (Flexible) decision making models based on Decision making Instrument by Lauri andSalantera(2002).Nurses' knowledge, experiences, presence of guidelines including clear pathway to elicit response have a direct effect on nurse's decision making. However, availability of well-defined guideline that includes criteria for activation and pathway is helpful to abridge process of decision making and improve reliability of activating RRT.

Apart of the belief of the nurses that RRT brings help more quickly and it benefits both health care practitioners (ward nurses and primary team), some nurses still view that activating RRT yields to increase workload. In addition to the abovementioned aspects that affect decision making of nurses to activate RRT, hopelessness or feeling of neither empowered nor heard, doubt, confidence, fear of getting blamed or accused of activating RRT by mistake, stressed, and shocked are among the emotional reactions of nurses in responding in crisis.

Large number of RRT activations are from Medical Unit succeeded by intermediate care unit as compared to surgical units and its subspecialties. Although this study does not include the medical diagnosis or specific case of patients, the reasons for summoning RRT was searched. Alterations in neurologic status, oxygen saturation (SPO_2), respiration, blood pressure, and heart rate are the common reasons in activating RRT. Chest pain, seizure, and alteration in fluid volume status are the least common reasons. Further, nurses activate RRT according to the institutions set criteria however, some nurses still activate for other reasons such as hypoglycemia and whenever they feel that the condition warrants RRT help.

Prevalence rate of cardiopulmonary arrests (code blue) and rapid response (RRT) activation are inversely proportional. When RRT activation rate is high, CPR rate is low, vis-a-vis. This is suggestive that early detection and timely activation of RRT reduces code blue rates (CPR). RRT has a great influence in patient's recovery. ICU admission is not directly affected RRT activation.Some patients who were treated by RRT was observed to show improvement, discharged, and some are admitted to rehabilitation. RRT is viewed to help both patients and health care professionals.

Moreover, new pathway is developed combining traditional criteria for RRT activation, MEWS, and serious concerns of nurses for the activation. The role of relatives/ patient watcher is acknowledged and added as they could serve as additional eye of nurses apart of the monitoring devices.

6. RECOMMENDATION

Education and orientation is an essential part of improving the process and it also helps unexperienced staff to arrive to a decision promptly. Prudent documentation of RRT events is a pillar in understanding and analyzing process and directing improvement.Discussion and debriefing after RRT event is deemed necessary to assist improvement of team performance. Further research is needed to evaluate responses and views of ICU nurses in responding crisis situation including the primary treating team and ICU physicians.Likewise, thorough family education and orientation is suggested for them to report relevant data and in-depth study is further recommended regarding the participation of relatives in RRT i.e. detection of patient clinical deterioration.

7. ACKNOWLKEDGEMENT

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