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RESEARCH ARTICLE **OPEN ACCESS**

Assessment of Barriers, Perceptions, and Improvement Strategies Related to Rapid Response Team (RRT) Activation: A Comparative Study in an Oncology Setting

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Abstract:

Introduction/Objective: Rapid Response Teams (RRTs) play an important role in hospital safety systems, and they are offered to react to the initial signs of patient deterioration. Nevertheless, obstacles remain in the way of timely activation, particularly in situations related to such intricate care settings as oncology. This study aimed to take into account perceived barriers, issues, and improvement mechanisms of RRT activation in an expert oncology center.

Methods: A cross-sectional and descriptive study was conducted at Sultan Qaboos Comprehensive Cancer Care and Research Center (SQCCCRC) in Muscat, Oman. Two questionnaires in a structured format were distributed to general hospital employees (342) and RRT members (28). The questionnaires covered deactivating issues, negative factors, and issues related to working together. Data were analyzed using descriptive statistics and the Chi-square test in order to make comparisons of perceptions in terms of gender, experience, and age. Validity and reliability were attested based on expert checking, pencil-and-paper pilot testing, and high internal consistency (Cronbach's alpha = 0.84 in general staff and α = 0.79 in RRT).

Results: Among general staff (n = 342), the most common barriers were unawareness of activation thresholds, 27% (n = 92); uncertainty regarding determining activation thresholds, 22% (n = 75); and lack of systematic education regarding RRT, 22% (n = 75). Female employees more frequently mentioned issues with justification (23.1% *vs.* 20.4%, $\chi^2 = 4.95$, $p = .026$) and education gaps (24.1% *vs.* 19.0%, $\chi^2 = 5.78$, $p = .016$). Uncertainty among staff with 0–5 years of experience was also higher (33.3%, $\chi^2 = 7.85$, $p = 0.020$), as was difficulty in calculating early warning scores (26.7%, $\chi^2 = 8.41$, $p = 0.015$). Inhibiting factors included dependence on the physician (14%, n = 48), team leaders (12%, n = 41), misunderstanding vital signs (11%, n = 38), and failure to compute EWS (15%, n = 51). The highest operational impediment among RRT members (n = 28) was dual ICU responsibility (34%, n = 10), which heavily affected the delivery of an effective response during activation. The general staff (highest number 15, n = 51) and team coordination by RRT members (highest number 36, n = 10) had higher counts of quality definitions than automatic availability of equipment (highest number 13, n = 4).

Discussion: This paper indicated that a high proportion of staff are hesitant in activating the Rapid Response Team due to uncertainty associated with thresholds and fear of being interrogated, particularly among less experienced staff, which identifies the necessity of clear guidelines and regular training. Concurrently, there were certain barriers at a systemic level, such as incomplete handovers and dual responsibility in the ICU, which slowed responses and highlighted the necessity of enhanced team-level coordination and organizational support.

Conclusion: The application of RRTs in the oncology setting is undermined by knowledge gaps, role conflicts, and systemic constraints. Enhancing patient outcomes by educating staff members, flattening hierarchy, and strengthening response systems are significant strategies for improving patient outcomes.

Keywords: Rapid response team, Oncology, Clinical deterioration, Patient safety, Activation barriers.

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1. INTRODUCTION

Rapid Response Teams (RRTs) are multidisciplinary clinical teams to provide immediate assessment with concomitant management of patients showing signs of acute physiological deterioration; and they are comprised of trained professionals, including critical care nurses, respiratory therapists, and physicians. Rapid Response Teams (RRTs) are being used in hospitals throughout the world now as part of patient safety systems. They are teams who have been expected to intervene early over the deterioration of patients that is yet to become a life-threatening condition, such as transfer to the critical care unit or death [1]. However, things do not always evolve positively. In many cases, vital signs (such as abnormal blood pressure or breathing rate) will appear hours before cardiac arrest takes place, but are not addressed in time. Each year, about 290,000 in-hospital cardiac arrests occur in the USA [2, 3]; however, a good portion of these events go unreported. Failure to identify later signs and RRT activation as late as possible may contribute to a prolonged hospitalization and poor patient outcomes [4, 5].

To try to solve this gap, Rapid Response Systems (RRS) have been introduced in hospitals, which are based on four important elements: identification of deterioration (afferent limb); deployment of assistance (efferent limb); continuing enhancement; and administrative support, such as appropriate staff and equipment [6]. The National Early Warning Score Instrument (NEWS) tool is often also used during the first step to help nurses or physicians detect early risk and call in the RRT when it's needed [7, 8]. Not all calls are appropriate - up to 30% of RRT activations were for something that was not an emergency. Others are connected with comfort care or are not in a critical condition, resulting in the challenge of the work of the teams taking care of critically ill patients [3, 9].

The situation is complicated even more in an oncology setting. Cancer patients are predisposed to a situation where the condition progresses rapidly, and the decisions related to the care of cancer patients need to be extremely accurate! Mis-evaluation of escalation may have serious consequences. In such situations, fear of taking wrong decisions, decisional inadequacy, or apathy pertaining to the activation principles can be a limiting factor in the utilization of RRT. There are other issues, like a lack of communication or too much hierarchy in the clinical team [4, 10]. Staff often undergo training but might be afraid to be blamed or be able to go beyond their authority and, consequently, fail to act in time.

RRTs have been extensively researched in the non-oncology ward environment; however, there is little research on them in oncology centres. Therefore, general RRT models may not be totally appropriate for immunocompromised patients and patients with advanced disease [11]. Solutions that are effective in other departments may not work in oncology.

Accordingly, the following research questions were intended to be answered in this study: (1) What are the barriers and inhibiting factors that delay the activation of the Rapid Response Team (RRT) in the oncology settings? and (2) What are the differences in the perception of general staff and members of the RRT?

This paper discusses the perceptions of RRT system staff in the cancer care environment, how the teams are limited in terms of system use, and possibilities for improvement. Based on the participants' feedback, an attempt is made to offer thoughts on how RRT could be improved in terms of effectiveness.

2. METHODS

2.1. Study Design and Setting

This was a cross-sectional and descriptive study with the aim of exploring the staff's opinions, challenges, and obstacles to activating the Rapid Response Team (RRT). It was also studied the difference in perceptions between both general hospital personnel and personnel directly involved in the RRT. The research study was carried out at University Medical City, Sultan Qaboos Comprehensive Cancer Care and Research Center (SQCCCRC), Muscat, Oman. As a tertiary care institution specializing in oncology, it offers both inpatient and outpatient services, including ICU facilities, and has a collaborative clinical team of professionals to provide the complex management of cancer.

2.2. Sampling

A non-probability convenience sampling method was applied to select the participants under two categories: (1) hospital-wide staff, both clinical and non-clinical staff (total staff = 700), and (2) selected members of the Rapid Response Team (RRT) (total RRT staff = 45). The rate of response among the general staff group was 48.9% (342/700), whereas the rate of response among RRT members was 62.2% (28/45).

2.3. Inclusion and Exclusion Criteria

Inclusion criteria were implemented for full-time employees working at the Sultan Qaboos Comprehensive Cancer Care and Research Center (SQCCCRC) who were directly or indirectly involved in patient care/emergency-related duties and who were willing to participate in the research study of personal preference. Eligible participants were both general hospital personnel (clinical and non-clinical) and designated personnel of the Rapid Response Team (RRT).

The exclusion criteria were applied to temporary staff, interns, trainees, and employees not involved in clinical and emergency functions. Surveys with repetition or incompleteness were excluded from the analysis to obtain reliable and high-quality data.

2.4. Instruments

The first questionnaire was carried out among the general hospital employees and contained several questions exploring barriers and inhibiting factors of the Rapid Response Team (RRT) activation. Among the impediments, staff were questioned with regard to imprecise activation limits in the presence of patient deterioration without obvious evidence, inconsistent training of RRT, and justification of RRT activation decision-making, which has been reported as a key deterrent to immediate RRT response [11, 12]. The survey also consisted of questions on whether staff had previously activated the RRT, had a bad experience, or felt that RRT activation didn't apply to their role. Additional issues tackled were hierarchical, the workload of the ICU and surgical nurses, and the insufficiency of ICU/HDU capacity related to RRT responsiveness [4, 12].

Items in the inhibiting factors section were related to the individual and system level got issues within policies of their organizations, such as fear of reprimand or blame, inadequate knowledge of policies in their organizations, and unfamiliarity with clinical criteria required in activating RRT [13-15]. Other possible impacts of delayed RRT activation included the fact that team leaders or physicians were likely to initiate activation, failure to recognize warning signs, or failure to calculate early warning scores [11, 14]. Additional barriers identified were the unavailability of effective paging systems and shortages in RRT responsiveness, which were aligned with previous literature [13, 14].

The second, which was a questionnaire used by RRT members, including ICU nurses, respiratory therapists, and physicians, discussed operational and behavioral challenges. Common themes that have been activated event concerns ranged from unclear documentation provided by DNR, requests to address non-RT issues, failure to recognize early deterioration, poor communication with ward staff, and the negative impact this has on how effective the RTT is [16, 17]. Issues such as patient rooms being crowded, lack of required supplies, and patients being called instead of Code Blue being called out were also reported [3, 9].

The area of team member challenges showed stressors such as emotional exhaustion, staffing shortages, and performing duties outside the scope of practice [1, 4]. Concurrent management of ICU patients and responding to emergencies in other areas, as well as a lack of support from ward physicians during activations, led to burnout and decreased productivity [4, 11]. Additional issues in line with previous literature were a lack of designated physical space, poor coordination, and a sense of belonging within RRT [1, 14, 16].

Overall, the two surveys were designed to form an overview of perceived barriers and operational difficulties relating to RRT activation within an oncology care environment and to identify potential areas for improvement for both general staff and specialised response teams [11-17].

2.5. Validity and Reliability

A review of the initial drafts of the questionnaires was conducted by a panel of five experts with experience in critical care, nursing leadership, and clinical quality at the Sultan Qaboos Comprehensive Cancer Care and Research Center (SQCCCRC). Their feedback contributed to improvements in wordings, clarity, and clinical relevance, especially hierarchical dynamics, uncertainty in activation, and operational issues. Minor changes relating to face and construct validity were made according to expert recommendations.

Internal consistency reliability was evaluated by using Cronbach's alpha coefficient for the two questionnaires. The general staff questionnaire showed good internal consistency (Cronbach's a = 0.84), while the RRT member questionnaire showed acceptable reliability (Cronbach's a = 0.79), showing consistent response from item to item.

A pilot test with 20 people (15 general staff and 5 RRT members) was undertaken to determine clarity and completion of the questionnaire, and understanding of items. The average time taken to complete was 8-10 min, with no significant issues having been identified regarding comprehension. Minor wording changes were made to two questions regarding clarity of training, specifically trying to differentiate between activation-related barriers and inhibiting factors. Pilot findings were consistent with the feasibility, clarity, and adequacy of the instruments for use in full-scale implementation.

2.6. Data Collection

Data collection was undertaken over the course of four weeks using a digital form *via* QR codes and institutional email links. Participation was anonymous and voluntary, and no identifying information was collected. Weekly reminder messages were distributed over the data collection period to improve response rates and to ensure maximum participation from the department.

2.7. Data Analysis

Microsoft Excel version 365 and IBM SPSS version 29.0 were used to enter and analyze data. Descriptive statistics were initially used to report characteristics of the participants, barriers reported by the participants, inhibiting factors, and improvements suggested. Frequencies and percentages were determined for categorical variables for both general staff and RRT groups. Cross-tabulations (using appropriate statistical tests [Pearson's chi-square]) were performed to test associations between demographic variables (gender, years of experience, and age group) and important reported barriers and behavioral factors. Significance testing was applied to see whether there were differences in perceptions and activation-related challenges of subgroups. Comparative analysis between the general staff and RRT members was also conducted to measure the perception difference according to staff roles. No missing data imputation was performed, and all of the variables maintained the original coding. Data interpretation was aided by results that were tabulated without the aid of advanced modeling and regression analysis.

2.8. Ethical Considerations

The study was conducted using the ethical principles of the Helsinki Declaration, and the study was approved by the Survey Research and Ethics Committee, University Medical City (CCCRC-122-2024). Participation was voluntary, and informed consent was implied through submission of the survey. No personal identifying information was collected in order to assure respondent confidentiality and institutional compliance with ethical standards.

3. RESULTS

The demographic statistics are described in Table **1**, which depicts the demographic profile of the participants: general staff (342) and RRT members (28). The female staff percentage of general staff was 57%, whereas the male staff percentage was 43%, whereas the RRT staff had a 50-50 balance of staff between male and female staff. Almost all general staff (99%) were from a clinical background, and only 1% were non-clinical. The largest number (61) in the RRT group was made up of staff nurses, followed by respiratory therapists (21) and critical care physicians (18). Regarding age, the largest segment (94%) was between the ages of 20 and 50 years, and RRT staff (89%) between the ages of 20 and 40 years. Concerning professional experience, the most frequent category of all staff (56%) and RRT staff (71%) was 6 to 15 years of service, with a smaller proportion of members having more than 15 years of service (21% and 13%, respectively).

Table 1. Participant demographics (n = 342 all staff, n = 28 RRT staff).

Characteristic	All Staff (n = 342)	%	RRT Staff (n = 28)	%
Gender	-	-	-	-
Male	147	43%	14	50%
Female	195	57%	14	50%
Profession	-	-	-	-
Clinical Staff	338	99%	-	-
Non-Clinical	4	1%	-	-
Critical Care Physician	-	-	5	18%
Respiratory Therapist	-	-	6	21%
Staff Nurse	-	-	17	61%
Age	-	-	-	-
20–50	321	94%	-	-
>51	21	6%	-	-
20–40	-	-	25	89%
>40	-	-	3	11%
Years of Experience	-	-	-	-
0–5	75	22%	5	16%
6–15	192	56%	20	71%
>15	72	21%	3	13%

The barriers and inhibiting factors in the activation process of the Rapid Response Team (RRT) by the staff from SQCCCRC are presented in Table **2** based on responses from 342 staff members. Among the identified barriers, lack of knowledge about recognition of when to activate RRT was the most commonly experienced barrier, especially in cases of slow or progressive clinical deterioration, and was identified by 27% of staff (n=92). Lack of consistent education on RRT and the perceived need to "justify" the decision to activate both penned a 22% response from participants (n = 75). Less commonly reported barriers were interdisciplinary hierarchy or chain of command (9%, n = 31); lack of perceived barriers (6%, n = 21); and increased workload of ICU or medical-surgical nurse (3%, n = 10). Other minimal causes were limited nursing experience (3% of the sample, n=10), never having called the RRT (3%, n=10), and isolated comments of negative experience with RRTs (1%, n=3).

Two of the most frequent inhibiting factors preventing the staff from activating the RRT, even when needed, were the lack of knowledge and inability to calculate the early warning score, which was among 15% of the staff (n = 51). This was followed by the need for mobilizing the RRT by the physicians (14%, n = 48) and team leaders (12%, n = 41). Additional factors that had close to the same occurrence were lack of knowledge about vital signs (11%, n = 38), inadequacy in knowledge associated with activating criteria (10%, n = 34), and a failure to detect the change in patient condition (9%, n = 31). Other important concerns were also mentioned, and they included fear of being reprimanded or blamed by the RRT (4% (n = 14), the negative or no response (5% (n = 17), as well as lack of policy awareness (6% (n = 21). Problems that were described rarely were a lack of a paging system (1%, n = 3) and multiple factors in general (1%, n = 3). These outcomes identify an uneducated and unstructured environment, which contributes to the delay and insufficient activation of the RRT.

Table **3** gives a narrative comparison of the top three frequently reported barriers to Rapid Response Team (RRT) activation - uncertainty about activation, perceived need to justify activation, and lack of RRT training - by gender, level of experience, and age among general staff at SQCCCRC (n=342). The results show that levels of concern differed according to staff demographics, and the test of statistical significance was the chi-square test.

The three barriers were noted more often by females than by males. The difference between the uncertainty about reporting activation was not statistically significant (29.2% *vs*. 23.8%; kh2 = 0.88, $p = 0.348$). Females, however, were significantly more likely to report a need to justify activation (23.1% *vs*. 20.4%; kh2 = 4.95, $p = 0.026$) and not offering routine RRT training (24.1% *vs*. 19.0%; kh2 = 5.78, $p = 0.016$). This raises the possibility of gender differences in confidence or self-assertion in RRT protocol initiation.

Table 2. Reported barriers and inhibiting factors to rapid response team (RRT) activation among staff at SQCCCRC (n = 342).

Category	Item	%	n
Barriers	Lack of consistent RRT education	22%	75
-	Perceived need to justify the decision to activate RRT	22%	75
-	Uncertainty about when to activate RRT (if deterioration is subtle or gradual)	27%	92
-	Less nursing experience	3%	10
-	NA – never called for RRT	3%	10
-	Negative past experiences with RRTs	1%	3
-	No barriers	6%	21
-	ICU/HDU staff do not activate RRT	1%	3
-	Not a clinical staff member	1%	3
-	Not applicable to my experience	1%	3
-	Interdisciplinary hierarchy or chain of command	9%	31
-	Increased workload for ICU and medical–surgical nurses	3%	10
Inhibiting Factors	Fear of reprimand or blame	4%	14
-	ICU/HDU staff do not activate RRT	1%	3
-	Inability to detect changes in the patient's physiological condition	9%	31
-	Lack of knowledge of the Policy on the rapid response team	6%	21
-	Lack of knowledge on the criteria to activate RRT	10%	34
-	Lack of a paging system (RRT not notified by team members)	1%	3
-	Misinterpretation of vital signs	11%	38
-	Negative or lack of response from RRT	5%	17
-	Relying on the physician to activate RRT	14%	48
-	Relying on the team leader to activate the RRT	12%	41
-	Unable to calculate the early warning score	15%	51
-	Multiple factors	1%	3

Table 3. Top barriers by general staff per demographics (n = 342).

Demographic Group	Uncertainty About Activation		Need to Justify Activation		Lack of RRT Education	
-	n (%)	X2 (*P*-value)	n (%)	X2 (*P*-value)	n (%)	X2 (*P*-value)
Male (n = 147)	35 (23.8%)	χ^2 = 0.88 (p = 0.348)	30 (20.4%)	χ^2 = 4.95 (p = 0.026)	28 (19.0%)	χ^2 = 5.78 (p = 0.016)
Female (n = 195)	57 (29.2%)		45 (23.1%)		47 (24.1%)	
Experience: 0–5 yrs (n = 75)	25 (33.3%)	χ^2 = 7.85 (p = 0.020)	20 (26.7%)	χ^2 = 6.94 (p = 0.031)	18 (24.0%)	χ^2 = 5.62 (p = 0.034)
Experience: 6–15 yrs (n = 192)	50 (26.0%)		40 (20.8%)		45 (23.4%)	
Experience: >15 yrs (n = 72)	17 (23.6%)		15 (20.8%)		12 (16.7%)	
Age 20–50 (n = 321)	88 (27.4%)	χ^2 = 3.41 (p = 0.065)	70 (21.8%)	χ^2 = 4.99 (p = 0.025)	70 (21.8%)	χ^2 = 4.76 (p = 0.029)
Age >51 (n = 21)	4 (19.0%)		5 (23.8%)		5 (23.8%)	

Table 4. Top inhibiting factors to RRT activation by demographics at SQCCCRC (n = 342).

Demographic Group	Relying on the Physician to Activate RRT		Misinterpretation of Vital Signs		Unable to Calculate EWS	
-	n (%)	χ^2 (*p*-value)	n (%)	χ^2 (*p*-value)	n (%)	χ^2 (*p*-value)
Male (n = 147)	18 (12.2%)	χ^2 = 0.81 (p = 0.368)	15 (10.2%)	χ^2 = 0.31 (p = 0.579)	18 (12.2%)	χ^2 = 1.23 (p = 0.267)
Female (n = 195)	30 (15.4%)		23 (11.8%)		33 (16.9%)	
Experience: 0–5 yrs (n = 75)	15 (20.0%)	χ^2 = 7.85 (p = 0.019)	12 (16.0%)	χ^2 = 4.22 (p = 0.121)	20 (26.7%)	χ^2 = 8.41 (p = 0.015)
Experience: 6–15 yrs (n = 192)	25 (13.0%)		18 (9.4%)		25 (13.0%)	
Experience: ≥15 yrs (n = 72)	8 (11.1%)		8 (11.1%)		6 (8.3%)	
Age 20–50 (n = 321)	45 (14.0%)	χ^2 = 4.11 (p = 0.042)	36 (11.2%)	χ^2 = 4.45 (p = 0.061)	48 (14.9%)	χ^2 = 4.99 (p = 0.076)
Age >51 (n = 21)	3 (14.3%)		2 (9.5%)		3 (14.3%)	

Employees with lower experience (0-5 years) suggested all three barriers at higher levels than the other experienced employees, with employees who had more than 15 years of experience suggesting all three barriers at a higher level. For instance, close to a third of early-career staff reported having uncertainty about activation when compared with a smaller proportion of the most experienced group. All three differences that related to the level of experience were statistically significant: uncertainty (kh2 = 7.85, p = 0.020), justification (kh2 = 6.94, p = 0.031), and lack of education (kh2 = 5.62, p = 0.034). These outcomes suggest a very real need for some specific support/training for less experienced professionals. Barriers reported more often by younger workers (20-50 years) than older workers (above 51 years) came to light with age-related differences. The younger group was less certain about activation (27.4% *vs.* 19.0%), although this was not statistically significant (kh2 = 3.41, p = 0.065). However, differences associated with justification of activation (21.8% *vs.* 23.8%) and lack of RRT education (21.8% *vs.* 23.8%) were statistically significant (kh2 = 4.99, p = 0.025 and kh2 = 4.76, p = 0.029, respectively), reinforcing the observation that younger staff might need more detailed communication and reinforcement of RRT procedures and policies.

Overall, the results show that younger, less experienced, and female staff are more likely to experience a barrier against or fellowship with RRT activation. This is why it is vital to have ongoing education, better communication about what needs to be activated, and strategies within organizations to ensure that all employees feel empowered to react effectively in an emergency.

The breakdown of the most common inhibiting factors for RRT activation in SQCCCRC at the gender, years of experience, and age level is presented in Table **4**. Specifically, it focuses on three main barriers: reliance on physicians to trigger the RRT, misinterpretation of vital signs, and inability to calculate the Early Warning Score (EWS). Frequencies and percentages for each of the factors and the results of the chi-square (kh2) tests on the significance of the subgroups are shown in the table.

In terms of gender, these inhibiting factors were reported similarly for males and females in the staff. For example, 12.2% of male employees and 15.4% of female employees reported reliance on physicians to be activated in RRT. Similarly, 10.2% of males and 11.8% of females mentioned misinterpretation of vital signs, and 12.2% of males, when compared with 16.9% of females mentioned inability to calculate the EWS. None of these differences proved to be statistically significant because of p-values greater than 0.05 (p = 0.368, p = 0.579, and p = 0.267, respectively) at which gender had no significant effect on these inhibiting behaviors.

Contrarily, years of experience revealed a greater association with RRT activation barriers. Staff with 0-5 years of experience were found to be more likely to report reliance on physicians (20.0%) than those with 6-15 years (13.0%) and more than 15 years of experience (11.1%). This difference was calculated to be statistically significant (kh2 = 7.85, p = 0.019), which may indicate that less experienced staff may feel less sure-footed or empowered to make RRT calls on their own. Similarly, the inability to calculate the EWS was more common among newer staff (26.7%) compared with more experienced counterparts

(13.0% for 6-15 years and 8.3% for >15 years), and this difference was also statistically significant [kh2 = 8.41, p = 0.015]. However, misinterpretation of vital signs (although more common among less experienced staff, 16.0%) did not differ significantly between the experience groups (kh2 = 4.22, p = 0.121).

Staff aged 20-50 years reported inhibiting factors a little bit more than those aged above 51 years. For instance, the use of physicians was stated by 14.0% of younger staffers compared to 14.3% of older staffers. Only one statistically significant difference was seen about physician dependence (kh2 = 4.11, p = 0.042), and the other indicators of misidentification of vital signs (*i.e.*, misdiagnosis of hypotension) and inability to calculate EWS were not significantly different between age groups (p = > 0.05).

Table **5** describes the operational and setting issues RRT staff face during activation events. DNR-Related Issues and Inappropriate Handovers. These were the most reported activation-related issues (14% each, n = 4). These were followed by a lack of required tools or resources during activation (12%, n = 3) and communication issues between the physicians and the RRT (10%, n = 3). Overcrowded patient rooms with the presence of family (10%, n = 3), consultation about non-RRT related cases (8%, n = 2), inaccessibility of ward staff (8%, n = 2), and requests to perform non-RTT related tasks such as insertion of lines (8%, n = 2) were also reported. Less frequent problems included inappropriate responses of Code Blue (6%), not recognizing early deterioration (4%), and other responses that were selected (no issues, or all of the above) (2% each).

As for team member issues, the most common issue of concern was the concurrent responsibility of ICU patients during activation of RRT, which was reported by 34% of RRT staff (n = 10). This was followed by covering staff shortages (23%, n = 6) and time pressure associated with dealing with the deteriorating cases in the ICU (11%, n = 3). Other challenges included poor coordination of teams (11%, n = 3), being used outside the intended scope of the RRT (9%, n = 3), and a lack of physical space to perform RRT operations (7%, n = 2). A small proportion of the respondents (2%, n = 1) reported emotional and psychological stress and a lack of physician preparedness in the wards.

Table **6** gives suggestions for improving RRT activation and effectiveness at SQCCCRC from general staff and RRT members. Out of the general staff, educational intervention sessions on RRT (22%, n = 75), routine generation of early warning scores (17%, n = 58), and frequent RRT simulation (15%, n = 51) were the most frequent proposed interventions. Other suggestions included awareness campaigns (14%), visual reminders of RRT criteria or procedures (10%), and encouragement of independent decision-making (9%). Less commonly recommended but of note included re-emphasising RRT policy (7%, n = 24); learning from experience through unit-based discussions (3%, n = 10); promotion of a non-punitive culture (3%, n = 10), and meetings with junior doctors regarding deterioration recognition (1%, n = 3). Only a few respondents (3 or 1%) recommended implementing all improvements within one year.

Table 5. Issues and challenges reported by RRT staff during activation events at SQCCCRC (n = 28).

Category	Issue/Challenge	%	n
Activation Event Issues	Communication issue between the physician and the RRT	11%	3
-	Consultation for non-RRT issues	7%	2
-	DNR-related issues (*e.g.*, missing DNR orders)	14%	4
-	Failure to detect symptoms early	4%	1
-	Improper handover to RRT	14%	4
-	Lack of tools/resources during RRT	11%	3
-	Performing tasks outside RRT scope (*e.g.*, line insertion)	7%	2
-	RRT was activated instead of Code Blue	7%	2
-	The room was crowded with patients' relatives	11%	3
-	Ward staff are not available	7%	2
-	No issue	4%	1
-	All the above	4%	1
Team Member Challenges	Covering for lack of resources	22%	6
-	Emotional and psychological stress	4%	1
-	Feeling misused as an RRT nurse	11%	3
-	ICU case increases time pressure	11%	3
-	Patient responsibilities in the ICU	36%	10
-	Lack of ward physician preparation before activation	4%	1
-	Physical workspace constraints	7%	2
-	Poor team coordination	11%	3

Table 6. Staff recommendations for improving RRT activation (all staff n = 342, RRT staff n = 28).

Recommendation	%	n
All Staff n = 342	-	-
Attending educational sessions related to RRT	22%	75
Conduct an awareness campaign on RRT activation	14%	48
Conduct frequent RRT simulations	15%	51
Encourage independent decision-making for staff	9%	31
Automatic calculation of the early warning score	17%	58
Visual reminders (*e.g.*, RRT criteria, videos, notifications)	10%	34
Learn from past experiences (unit-level discussions)	3%	10
Re-emphasize education on RRT policy	7%	24
A meeting with junior doctors about the deterioration response	1%	3
A non-punitive environment	3%	10
All the above (spread over a year)	1%	3
RRT Staff n = 28	-	-
Additional staff during RRT calls	18%	5
Better communication and handover	29%	8
Enhanced team coordination strategies	36%	10
Improved equipment availability	14%	4
Full handover from the doctor inside the ICU	4%	1
RRT bag	4%	1

Meanwhile, RRT members focused on making structural and operational improvements. The highest-ranked recommendation was for better team coordination (36% n = 10), followed by better communication and handover procedures (29% n = 8) and improved personnel levels during RRT calls (18% n = 5). Additional recommendations were better availability of equipment (13%, n=4), complete handovers by ICU physicians (2%, n=1), and readiness of RRT bag (2%, n=1). These findings suggest the need for the use of a combination of training, process support, and logistical preparedness to enhance the quality and timeliness of RRT interventions.

4. DISCUSSION

This study evaluated perceptions, barriers, and improvement strategies associated with the activation process of the Rapid Response Team (RRT) in an oncology facility. Insights from both general staff and members of RRT published mixed experiences with respect to how training and communication norms affect activation behaviors. Even though most of the participants had clinical training and experience in the middle of their careers, many of the general staff indicated difficulty deciding when RRT activation was warranted, especially when deterioration was not obvious or rapid. These trends are consistent with past research in acute care settings [1-3]. Awareness of the existence of RRT alone is not enough without the clarity of the criteria for activation, and reflects poor integration of the frameworks of rapid response into clinical decision-making [4-6].

One of the most reported barriers was the perceived need to justify the activation of RRT. This requirement may be due to the hierarchical structures and vague expectations within clinical teams. Junior or newly employed staff may not want to switch on the RRT out of fear of being criticized or negatively judged by senior colleagues, and this may cause delay in timely intervention [10, 11]. Fear of wrong decision-making and going beyond perceived authority also adds to hesitation.

Training gaps were also strong. Many staff described having little familiarity with early warning scores and trends of vital signs and no access to reliable and ongoing updates on RRT protocols. Tools like NEWS were often commented upon, and it was noted that some staff found calculation of scores, or understanding of triggering criteria, difficult. Prior studies have stressed the importance of early warning systems if they are to be effective, including ongoing organizational training and reinforcement [6-8].

Dependence on the physicians or team leaders to take the initiative to RRT activation was another theme repeatedly. This reliance could not come from negligence but could have a basis through unclear delineation of roles or negative experiences in the past. Hesitation represents uncertainty about responsibility and is associated with fear of exceeding the professional boundaries, which is consistent with the literature on interprofessional communication and teamwork dynamics [13, 14].

Younger and less experienced staff were more likely to report these challenges. Respondents with less experience often had uncertainty and fear of being judged, and confidence in recognizing patient deterioration. These findings are consistent with prior studies suggesting that novices in the professions will display limited instances of clinical autonomy and escalation behavior due to lack of experience and organizational support [11, 14]. Younger staff also pointed out gaps with respect to policy awareness and EWS training and highlighted gaps in orientation and mentorship.

These findings suggest that challenges are more than just those associated with training. New nurses may not be confident and not supported well enough to make decisions for escalation, and this may lead them to fear being criticized or going wrong. Empowerment frameworks propose that inclusion in planning, simulation-based training, and opportunities for feedback may contribute to confidence and promote the use of RRT as patient conditions get worse.

RRT members experienced unique activation challenges such as a lack of suitable equipment, poor communication during handover, and the absence of clear DNR documentation. Such logistical and process-related issues have been widely documented as contributing factors to delayed response time [4, 16]. In addition, systemic pressures such as ICU workload, staff shortages, and emotional burnout, especially balancing the ICU job with emergency response, were emphasized [14, 15].

General staff often suggested more simulations, visual cues, educational programs, and regular awareness programs to enhance RRT activation. Quality improvement models such as FOCUS-PDSA have been shown to be effective in improving escalation skills and avoiding clinical errors [18-20]. Staff perceived that such training would make them less apprehensive and normalize RRT activation.

In contrast, members of RRT focused on improving areas at the system level, such as improving handover processes, regular replenishment of emergency kits, and better team communication. Adequate ICU support through activations was also mentioned [20-25]. These difficulties are associated with the efferent limb of the fast response system, where inefficiencies account for possible delays and miscommunication [1, 9].

The oncology care environment exaggerates these difficulties. Symptoms associated with oncology patients are often vague or are linked to the treatments being received, so it can be hard to determine the difference between expected changes and critical deterioration [20-25]. Emotional stress linked to caring for complex or end-stage cases makes decisions on escalations even more complex. Despite the urgency and unique demands of oncology environments, the field of RRT research is sparse in this area [3], a gap that highlights the need for specific research and interventions in this area.

5. STUDY LIMITATION

Key limitations are the single-center design, making generalization to other oncology or general hospital settings. One of the problems relating to the use of self-reported surveys is the potential for response bias, especially with respect to the perception of challenges and staff behaviour. As the nature of the study is cross-sectional, this allowed zero conjecture between characteristics of staff and activation patterns. Although the sample size was sufficient, the subgroup of RRT was relatively small (n = 28), which may have limited the validity of subgroup comparisons. The general staff Response rate did not go to 50%; this would imply possible non-response bias and that certain perspectives are underrepresented. These factors should be kept in mind when interpreting the results or applying them to other situations.

6. RECOMMENDATIONS AND PRACTICAL IMPLICATION

In light of the findings, oncology institutions are encouraged to strengthen training efforts - specifically pertaining to the issue of when to activate the RRT, how to interpret early warning scores, and making clinical calls during the early signs of decline. A higher frequency of simulations, as well as mixed role practice, may help give junior or less experienced staff a greater sense of preparedness, as well as adjustment to hesitancy. Hospital policies may also need to be modified to better support staff autonomy and reduce the effects of hierarchy that often is a reason for delay. On the tech side, configuring automatic EWS tools and having visual reminders all across clinical areas might aid in faster decision-making and visually consistent awareness. Communication needs attention too--the use of standard formats when getting information to the handovers can be a way to avoid confusion. For RRT members, staffing and ICU pressures were an overarching concern, and improving staffing during activations could make a big difference in how fast and effectively the team was able to respond. Management should take a look at the current model of staffing of the RRT to minimize conflict between work in the ICU and RRT activations, to ensure that the team can respond rapidly and without divided responsibility. A simple digital tool could also be created for the RRT to be activated uniformly and for the calculation of the Early Warning Score to be automatically determined. Using an SBAR-based format (Situation, Background, Assessment, Recommendation) would help to increase communication and reduce uncertainty during the activation

CONCLUSION

This study provides a closer look at some of the multi-layered issues that contribute to the decision about how and when to activate a Rapid Response Team in oncology care. Educational shortfalls, unclear protocols, and the effects of team hierarchy stood out as major reasons why escalation may be delayed. Of particular interest, staff who were younger, female, or less experienced were more likely to report these challenges. On the other end, input from RRT members provided insight into the larger operational issues that include resource gaps and workflow burden during emergencies. Addressing these concerns will require some combination of specific training, cultural changes that foster staff confidence, and structural changes at the system level - particularly in specialized environments, as in cancer centers, where quick decisions are vital. The result of having many people in the RRT who have to juggle ICU duties while on activations also demonstrates the need for management to enhance the structure of the rapid response system.

AUTHORS' CONTRIBUTIONS

The authors confirm contribution to the paper as follows: O.A., R.I.: Study conception and design; R.I., H.S., G.A., M.M., J.C., G.G., K.H.: Data collection; O.A., R.I., H.S., K.B., A.Z., K.K.: Analysis and interpretation of results; R.I., J.A., A.K., R.K.: Draft manuscript preparation. All authors reviewed the results and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

RRT	=	Rapid Response Team
RRS	=	Rapid Response System
ICU	=	Intensive Care Unit
HDU	=	High Dependency Unit
EWS	=	Early Warning Score
NEWS	=	National Early Warning Score
DNR	=	Do Not Resuscitate
SQCCCRC	=	Sultan Qaboos Comprehensive Cancer Care and Research Centre
SPSS	=	Statistical Package for the Social Sciences

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study received ethical approval from the Research and Ethics Committee at University Medical City (CCCRC-122-2024).

HUMAN AND ANIMAL RIGHTS

The Helsinki Declaration has been followed for involving human subjects in the study.

CONSENT FOR PUBLICATION

Participation was voluntary, and informed consent was implied through survey submission.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

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CONFLICT OF INTEREST

Omar Ayaad is a member of the Editorial Advisory Board of the journal TOPHJ.

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