Research paper

A clinical competence approach to examine British and Finnish nurses' attitudes towards the rapid response system model: A study in two acute hospitals

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ARTICLE INFORMATION

ABSTRACT

Background: Nurses' clinical competence involves an integration of knowledge, skills, attitudes, thinking ability, and values, which strongly affects how deteriorating patients are managed.

Objectives: The aim of the study was to examine nurses' attitudes as part of clinical competence towards the rapid response system in two acute hospitals with different rapid response system models.

Methods: This is a comparative cross-sectional correlational study. A modified "Nurses' Attitudes Towards the Medical Emergency Team" tool was distributed among 388 medical and surgical registered nurses in one acute hospital in the UK and one in Finland. A total of 179 nurses responded. Statistical analyses, including exploratory factor analysis, Mann—Whitney U tests, Kruskal—Wallis tests, chi-square tests, and univariate and multivariate regression analyses, were used.

Findings: Generally, nurses had positive attitudes towards rapid response systems. British and Finnish nurses' attitudes towards rapid response system activation were divided when asked about facing a stable (normal vital signs) but worrisome patient. Finnish nurses relied more on intuition and were more likely to activate the rapid response system. Approximately half of the nurses perceived the physician's influence as a barrier to rapid response system activation. The only sociodemographic factor that was associated with nurses activating the rapid response system more freely was work experience ≥10 years.

Conclusions: The findings are beneficial in raising awareness of nurses' attitudes and identifying attitudes that could act as facilitators or barriers in rapid response system activation. The study suggests that nurses' attitudes towards physician influence and intuition need to be improved through continuing development of clinical competence. When the system model included "worrisome" as one of the defined parameters for activation, nurses were more likely to activate the rapid response system. Future rapid response system models may need to have clear evidence-based instructions for nurses when they manage stable (normal vital signs) but worrisome patients and should acknowledge nurses' intuition and clinical judgement.

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1. Introduction

Rapid response systems (RRSs) were introduced over two decades ago in health care to enhance patient safety and avoid hospital mortality.[1] The RRS is a hospital-level intervention to provide intensive care for deteriorating hospitalised patients. Despite good results from implementing RRSs, nurse activation of this system for deteriorating patients is still inconsistent.[2]

Nurses deliver frontline care and thus play a key role in the activation of RRSs.[3] Nurses' close assessments are critical in the management of deteriorating patients, especially when hospitals

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are overloaded during epidemics.[4] A delay in RRS activation by nurses results in adverse outcomes[5] and affects patient safety. Properly trained nurses ensure the safety of deteriorating patients.[6] Nurses' clinical competence in recognising and responding to deteriorating patients relies on their knowledge, skills, and attitudes[7] and whether they are novices or experts in their field.[8] Evidence suggests that nurses' familiarity with, agreement with, and perception of the benefits of RRSs increase the activation of RRSs.[9] In contrast, barriers, such as negative attitudes towards RRSs, decrease the activation of RRSs.[10,11] To increase nurses' clinical competence and enhance RRS activation, it is warranted to investigate nurses' attitudes and uncover what inhibits (known as RRS barriers) or encourages (RRS benefits) nurses to activate RRSs.

2. Background

2.1. Nurses' clinical competence in managing deteriorating patients

Nurses' competence is commonly presented based on an integrated holistic approach that is characterised as an integration of knowledge, skills, attitudes, thinking ability, and values.[8,12] This approach highlights the importance of the context and the complex combination of the elements of nurses' competence that nurses are required to apply and adopt in each clinical situation.[12] to the complexity and specific circumstances of managing deteriorating patients, the concept of capability has been suggested, in which nurses are required to enhance their competence to be able to respond to planned and unexpected situations in treating deteriorating patients.[13] The focus of the capability concept is on nurses' strengths in responding to the unique circumstances of each deteriorating patient.[14]

2.2. Continuing clinical competence for managing deteriorating patients

Continuing clinical competence is defined as nurses' ability to demonstrate that they have maintained their competence concerning the context of its practice and the related competence standards.[15] All nurses working at acute hospitals should have competence in recognising and responding to deteriorating patients.[16] Importantly, nurses' ability to identify deteriorating patients and activate an RRS is still suboptimal.[2] Nurse activation of RRSs is inconsistent, and one-third of RRS cases are not activated by nurses.[2,17] Evidence suggests that RRS implementation is associated with decreased hospital mortality, saving 1.5 lives per week,[18,19] and decreased in-hospital cardiac arrests.[19] Failure or delay in RRS activation leads to adverse outcomes for patients, including both an increased rate of hospital mortality and in-hospital cardiac arrest.[20] In the event of in-hospital cardiac arrest, cardiopulmonary resuscitation is commonly used.[21,22] The cardiopulmonary resuscitation success rate is rather low, at only 24.8%, and most surviving patients develop cardiovascular disease. Other associated adverse outcomes with failed or delayed RRS activation include an increased rate of intensive care unit (ICU) admissions and prolonged hospitalisation.[5,20] Continuing clinical competence highlights the importance of nurses' ongoing professional development to improve their competence in identifying and managing deteriorating patients.[23] Improving clinical competence relies on nurses' insight and awareness of their individual strengths and limitations in the identification and management of deteriorating patients.[24]

Evidence indicates that a greater understanding of nurses' competence in using RRSs is warranted.[25]

Continuing clinical competence is a well-adopted approach by hospitals for improving nurses' competence in RRS activation by focussing on nurses' knowledge and skills.[26] Attitude is one of the components of nurses' clinical competence[8,12] and contributes as a facilitator or barrier for RRS activation by affecting nurses' commitment to apply the implemented trigger thresholds for RRS activation.[27,28] Previous studies indicate that physician influence is a large barrier for nurses in RRS activation as nurses often do not view activating the RRS as a priority before calling the covering physician.[11,29] This study focused on British and Finnish nurses' clinical competence from the perspective of nurses' attitudes towards RRSs. Other components of nurses' clinical competence, such as knowledge and practice (skills) in recognising and managing deteriorating patients, were examined in other substudies of a 4-year "Patient Safety and RRS" research project.[30]

3. Aim

The aim was to examine British and Finnish nurses' attitudes as part of clinical competence towards the RRS in two acute hospitals with different RRS models. This study sought to answer the following research questions:

1) What are nurses' attitudes regarding the benefits and barriers to RRS activation?
2) Do nurses view inadequate patient management as a reason for RRS activation?
3) Are nurses' attitudes towards RRSs different in the two United Kingdom (UK) and Finnish hospitals?
4) What is the relationship between RRS barriers and patient management with nurses' demographic parameters (age, work experience, and previous ICU work experience)?

4. Methods

4.1. Design

This was a comparative cross-sectional correlational study.

4.2. Settings

The study settings were acute hospitals with different RRS models in the UK and Finland, where the National Early Warning Score (NEWS) and medical emergency team (MET), respectively, were in use.[31,32] The chosen hospitals (one hospital in each of the countries) had established an RRS for ≥ 5 years and had matching medical/surgical wards. The UK hospital was a National Health Services hospital with 750 beds, and the hospital in Finland was a university hospital with 671 beds.

4.3. RRS models: NEWS and MET

The RRS is built around the concept of specifying a set of parameters that act as trigger thresholds to track.[16] Various countries have implemented diverse RRS models.[33] The NEWS facilitates nurses' identification and management of deteriorating patients by using an aggregated weighted scoring system. It consists of seven parameters, including respiratory rate, oxygen saturation level, oxygen supplementation, heart rate, systolic blood pressure, temperature, and level of consciousness, wherein each parameter presents a numerical score ranging from 0 to 3. Nurses allocate a score to each parameter based on the level of abnormality (Supplementary Data Table A). The NEWS provides an algorithm for the identification and management of deteriorating patients based on the sum of the scores that nurses must follow (Supplementary

Data Table B). A total score of >7 triggers immediate RRS activation.[32] The MET model consists of seven parameters: respiratory rate, O_2 saturation level, heart rate, systolic blood pressure, the patient's general condition, nurses' concern, and other reasons (e.g., follow-up visits). In the MET system, any abnormality in an individual parameter triggers RRS activation (Supplementary Data Table A). Nurses are mandated to activate the RRS if a patient meets the trigger threshold criteria for RRS activation as defined in the implemented RRS model (NEWS and MET).[31,32]

4.4. Sample

Registered nurses (RNs) in bands 5, 6, and 7 in the UK and RNs in Finland met the inclusion criteria. Bands 5—7 refer to new RNs, RNs with more than 1 year of working experience, and RNs with a substantial amount of working experience, respectively. The exclusion criteria were RNs working in the ICU/critical care unit (CCU) wards, emergency department, neurology ward, or neonatal and paediatric ward. These wards do not use the adult MET/NEWS criteria or manage patients with low consciousness, which interferes with MET/NEWS criteria.

4.5. Data collection instrument

A modified version of the "Nurses' Attitudes Towards the MET" instrument was used.[34] The survey instrument was developed by Jones et al[34] in 2006, and it was later modified by others.[11,35—37]

The instrument uses a five-point Likert scale (strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, strongly agree = 5) to assess 17 items. We removed one item because of its ambiguity. Minor adjustments were made for the remaining items, such as replacing the term "MET" with "NEWS" in the UK. The questionnaire was in English. It was translated into Finnish.

Demographic information (age, work experience, and ICU work experience) was gathered. The items in the questionnaire were categorised into three groups: RRS benefits (six items), RRS barriers (eight items), and patient management (two items) (Table 2). In this study, the term "worrisome patient" refers to a patient who, despite showing normal vital signs and being stable from a medical point of view, makes nurses worried that something is wrong with the patient.

4.6. Ethical considerations

Ethical statement was acquired from ethical committees of the universities in the UK and Finland (UK: 160708-160702-21140819; Finland: Statement 11/2016) and the UK "Health Research Authority" (application ID: 210978). Permission was acquired from the UK hospital (UK: 01753634340) and Finland's University Hospital (Finland: Statement 11/2016). The Helsinki Declaration and General Data Protection Regulations (EU 2016/679) were followed in conducting this study. Permissions to use the previous tools were obtained from authors.[36,37] The reporting follows the STROBE guideline.[38]

4.7. Participant selection

RNs working in medical and surgical wards were recruited by random sampling. After the researchers met the hospital ward managers, the questionnaires, information sheets, and envelopes were handed to the managers, and a dedicated box for completed questionnaires was placed in each ward. Ward managers were asked to inform RNs about the research, and posters were distributed at wards asking interested RNs to obtain the questionnaire from their ward manager. The data collection took place for a 1-month period at each site in 2017 (Fig. 1).

4.8. Data analysis

IBM SPSS Statistics for Windows, Version 23.0 (Armonk, NY: IBM Corp.) was used for data analyses. Descriptive analysis was performed for participant demographics. Differences between British and Finnish nurses' demographics and attitudes were assessed using the chi-square test. An exploratory factor analysis was conducted to identify possible factors among the tool's 16 items. The Kaiser—Meyer—Olkin measure of sampling adequacy was 0.68, which meant that the sample size was sufficient (recommended value: 0.5). Bartlett's test of sphericity was significant with a value of 0.001 (P-value ≤0.05). Factor analysis was conducted using varimax rotation with Kaiser normalisation to allow free formation of factors. Eigenvalues ≥1 and communalities ≥0.3 were used. As a result, three factors were extracted. The internal consistency of the factors that emerged was assessed using Cronbach's alpha (*a*) coefficient (≥0.7 was accepted). Thus, two factors were retained, consisting of nine items (Cronbach's alpha values: factor 1 = 0.738, factor 2 = 0.740). Two computed sum variables were calculated based on the means of the items in each factor, forming "RRS barriers" (factor 1) and "patient management" (factor 2). The differences between the countries in computed sum variables were analysed by using the Mann—Whitney U test. The remaining items that did not present an acceptable internal consistency (Cronbach's alpha less than 0.7) were categorised based on their subject. One item was categorised under the RRS barrier category, and six items formed a new category called RRS benefit. Owing to the lack of good internal consistency among the items, we did not compute a sum variable, and the items were analysed individually.

Nonparametric tests were used in a univariate analysis to assess the differences between nurses' demographic variables and the computed sum variables (RRS barriers and patient management). The Mann—Whitney U test was used when the demographic variable consisted of two categories (previous ICU/CCU work experience), and the Kruskal—Wallis test was used when the demographic variable consisted of three or more categories (age, work experience).

A linear regression analysis was conducted to determine the correlation of the computed sum variables (RRS barriers and patient management) with all possible predictors (age, work experience, previous ICU/CCU work experience), and the results were expressed as B-coefficients with 95% confidence intervals and P-values. Pairwise comparisons were also conducted. A P-value ≤0.05 was set to indicate significant results.

4.9. Validity and reliability

Earlier studies categorised the items of the instrument variously, and there was no information about internal consistency.[11,34—37] Thus, the research team conducted an exploratory factor analysis and assessed Cronbach's alpha. To ensure the validity of the questionnaire's content in the translation process, the double-blind translation technique was applied. The survey was piloted in the UK with a team of three RNs and in Finland with a team of 10 RNs. Minor terminology modifications were made based on the pilot tests. The research team provided face validity of the modified instrument.

5. Results

5.1. Participants and descriptive data

From the two hospitals, 388 nurses were recruited (UK: n = 208; Finland: n = 180), and 179 nurses (UK: n = 86; Finland: n = 93) responded to the questionnaire (response rate = 46%). The majority

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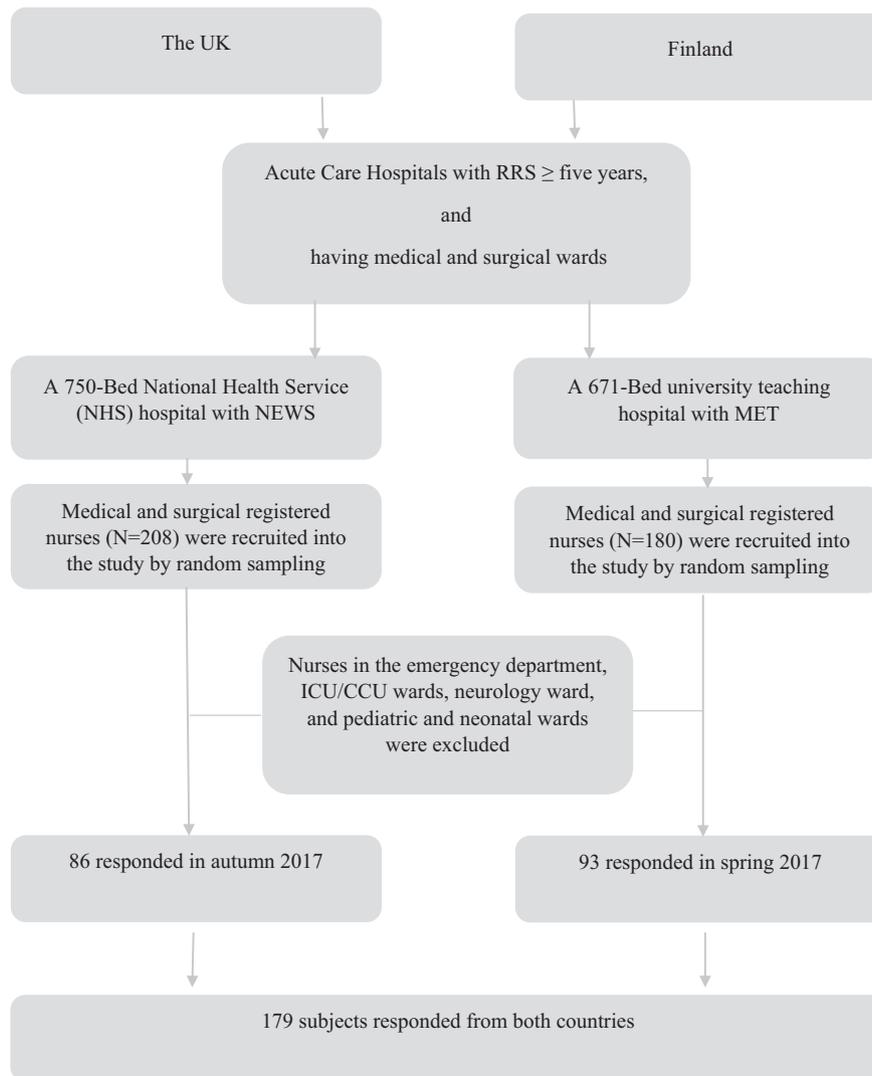
Fig. 1. Flowchart diagram of the study. UK = United Kingdom; RRS = rapid response system; NEWS = National Early Warning Score; MET = medical emergency team; ICU = intensive care unit; CCU = critical care unit.

were between 26 and 35 years old (n = 74, 41.3%), followed by those older than 46 years (n = 50, 28%). Approximately half of the participants had ≤5 years of work experience (n = 93, 52%), and approximately one-fifth of the participants (n = 37, 21%) indicated ≥21 years of work experience. Few had previous ICU/CCU work experience (n = 29, 16.2%) (Table 1).

5.2. RRS benefits

The majority of the participants (88.8%) considered the RRS beneficial, demonstrating strong agreement or agreement with regard to the RRS having a preventive role in cardiac and respiratory arrest. The vast majority of the participants expressed strong agreement or agreement about "RRS providing help for worrisome patients" (97.2%). Most of the participants (95.5%) found the RRS useful in preventing problems. The participants predominantly viewed the RRS as educational in managing deteriorating patients

(83.7%). More than half of the participants (58.8%) responded that they would activate the RRS in cases where they were worried about the patient, even if the patient presented normal vital signs. The majority (82.0%) of the respondents stated that the RRS provides support when doctors are unavailable (Table 2).

5.3. RRS barriers

Overall, the participants did not regard barriers as influential for RRS activation (mean = 1.76, standard deviation [SD] = 0.56; Table 3). The majority of the participants reported strong disagreement or disagreement with most of the RRS barriers, including "finding RRS as not helpful" (85.3%), "being reluctant to activate the RRS because of criticism" (82.6%), "believing in RRS over usage" (88.8%), "fear of criticism" (95%), "believing in causing a reduction in nurses' skills" (92.7%), "increasing workload" (83.8%), and "having a patient who does not look unwell but fulfils the RRS

Table 1
Sample characteristics.

Items	Finnish nurses	British nurses	P-value	Total
Sample size (n)	180	208		388
Respondents (n)	93[a]	86[a]		179
Response rate, %	52%	41%		46%
Age (years)			0.006	
18—25, n (%)	8 (8.6%)	16 (18.6%)		24 (13.4%)
26—35, n (%)	32 (34.4%)	42 (48.8%)		74 (41.3%)
36—45, n (%)	18 (19.3%)	14 (16.3%)		32 (18%)
$\geq$46, n (%)	35 (38%)	14 (16.3%)		50 (28%)
Work experience (years)			0.004	
$\leq$5, n (%)	40 (43.0%)	53 (63.8%)		93 (52%)
6—20, n (%)	26 (27.9%)	20 (24.1%)		46 (26%)
$\geq$21, n (%)	27 (29.0%)	10 (12.0%)		37 (21%)
Previous intensive care unit work experience			0.069	
Yes, n (%)	20 (21.5%)	9 (10.5%)		29 (16.2%)
No, n (%)	71 (76.5%)	71 (82.5%)		142 (79.5%)

[a] Power analysis: A minimum of 60 participants from each site were needed, with the assumption of the moderate effect size (x = 0.5), an α value of 0.05, and a power of 0.80.

activation criteria" (64.2%). A few (15.7%) reported strong disagreement or disagreement with calling the doctor before RRS activation when a patient was unstable. Approximately half of the nurses (49.2%) did not feel it was a priority to activate the RRS before calling the doctor, and approximately one-third (35.2%) held a neutral view (Table 2).

5.4. Patient management

Overall, the respondents disagreed or held a neutral opinion about inadequate patient management by nurses or doctors as the reason for RRS activation (mean = 2.65, SD = 0.91; Table 3). Approximately half of the participants expressed strong disagreement or disagreement with the need for RRS activation because of inadequate patient management by doctors (47.1%) or nurses (58.7%) (Table 2).

5.5. British versus Finnish nurses' attitudes towards the RRS

The study identified four significant differences between British and Finnish nurses' attitudes: (i) Finnish nurses said that they would activate the RRS for a stable patient (with normal vital signs) when they were worried about the patient more often than the British nurses reported they would (Finland = 68.2%, UK = 48.8%, P-value = 0.006; Table 2). (ii) Finnish nurses said that they would activate the RRS for patients when the doctor was unavailable more than the British nurses would (Finland = 91.3%, UK = 72.1%, P-value = 0.005; Table 2). (iii) Finnish nurses felt there were fewer barriers to activating the RRS than the British nurses did (Finland: mean = 1.63, SD = 0.503; UK: mean = 1.91, SD = 0.597; P-value = 0.001; Table 3). (iv) The British nurses expressed disagreement with inadequate management of the patient (by either nurses or doctors) as a reason for activating the RRS more than Finnish nurses did (P-value = 0.003; Table 3).

5.6. Correlation of RRS barriers and patient management with demographic factors

5.6.1. Univariate analysis

In univariate analysis, significant variables were work experience (P-value = 0.004) and age (P-value = 0.005), with respect to the RRS barrier sum variable only. Previous ICU/CCU work experience was significantly associated neither with the RRS barrier sum variable nor with the patient management sum variable (Table 4).

5.6.2. Multivariate analysis

In multivariate analysis, the only significant variable was work experience (P-value = 0.024), with respect to the RRS barrier sum variable. There were no significant variables associated with the patient management sum variable (Table 4).

Considering the results of the univariate and multivariate analyses, work experience was the most relevant factor. For work experience, the mean values grew as the work experience years increased up to 6—10 years (Table 4). More experienced nurses ($\geq$10 years of work experience) expressed more disagreement with RRS barriers.

6. Discussion

This study revealed nurses' attitudes towards managing deteriorating patients and RRS initiation. Managing deteriorating patients is often a complex clinical situation that demands competent nurses who are capable of responding to unexpected conditions.[14]

6.1. RRS benefits

Nurses held positive views of the RRS, which is in line with previous findings.[28,39] They believed it is beneficial, helpful, preventive, and educational. A problem arose when nurses were asked about managing a patient who was considered stable from a medical point of view (presenting normal vital signs) yet made the nurse worry that something was wrong with the patient. Only approximately half of the nurses reported that they would activate an RRS for such a patient. British and Finnish nurses had different attitudes towards this scenario. Nurses were more likely to activate the RRS when the RRS model included "worrisome" as one of the defined parameters for activation. Evidence suggests that "nurses' worry" could be a potential indicator of patient deterioration and could alert healthcare providers to seek an intervention in time.[40] The Finnish RRS model includes nurses' worry as an indicator of RRS activation. However, the authors of this study considered whether there is a blind spot in RRS models with regard to dealing with a stable but worrisome patient and often a failure to provide instruction for nurses about how to deal with such circumstances. Outlining nurses' clinical response in RRS models with regard to facing a stable but worrisome patient may facilitate a nurse's decision-making process for RRS activation by promoting an analytic decision-making model, thereby improving RRS activation. Evidence indicates that the analytic

Table 2
Summary of the aggregate responses to the survey comparing the study sites (N = 179).

Item	%															P-value	Mean (±SD)
	Strongly disagree			Disagree			Neutral			Agree			Strongly agree				
	UK	Fi	Total	UK	Fi	Total	UK	Fi	Total	UK	Fi	Total	UK	Fi	Total		
RRS benefits																	
The MET/NEWS prevents unwell patients from having cardiac and respiratory arrests	1.2	5.4	3.4	2.3	5.4	3.9	7.0	1.1	3.9	30.2	34.4	32.4	59.3	53.8	56.4	0.104	4.35 (±0.973)
The MET/NEWS allows me to seek help for my patients when I am worried about them.	–	–		–	–		3.5	2.2	2.8	29.1	24.7	26.8	67.4	73.1	70.4	0.651	4.68 (±0.526)
If I cannot contact the covering doctor about my sick patient, I activate the MET/outreach team.	1.2	2.2	1.7	9.3	1.1	5.1	17.4	5.4	11.2	27.9	35.9	32.0	44.2	55.4	50.0	0.005	4.24 (±0.957)
I would make call to a MET/outreach team on a patient I am worried about even if his/her vital signs are normal.	6.0	2.2	4.0	28.6	8.8	18.3	16.7	20.9	18.9	34.5	47.3	41.1	14.3	20.9	17.7	0.006	3.59 (±1.103)
The MET/NEWS can be used to prevent a minor problem from becoming a major problem.	–	–	–	3.5	1.1	2.2	3.5	1.1	2.2	27.9	23.7	25.7	65.1	74.2	69.8	0.380	4.63 (±0.643)
MET/NEWS teach me how to manage sick patients on my unit better.	0.0	2.2	1.1	3.5	2.2	2.8	5.9	18.3	12.4	49.4	40.9	44.9	41.2	36.6	38.8	0.056	4.17 (±0.836)
RRS barriers																	
The MET/NEWS is not helpful in managing sick patients on the unit.	45.2	55.4	50.6	39.3	30.4	34.7	2.4	9.8	6.3	7.1	3.3	5.1	6.0	1.1	3.4	0.038	1.76 (±1.014)
When one of my patients is unstable, I call the covering doctor before calling a MET/outreach team.	3.5	3.2	3.4	12.8	11.8	12.3	34.9	35.5	35.2	39.5	38.7	39.1	9.3	10.8	10.1	0.997	3.40 (±0.945)
I am reluctant to activate MET/outreach team for my patient because I will be criticized if they are not that unwell.	40.7	44.6	42.7	41.9	38.0	39.9	9.3	14.1	11.8	5.8	2.2	3.9	2.3	1.1	1.7	0.562	1.82 (±0.909)
I think that MET/NEWS is overused in the management of hospital patients.	22.4	59.1	41.6	61.2	34.4	47.2	12.9	5.4	9.0	1.2	0.0	0.6	2.4	1.1	1.7	0.001	1.74 (±0.783)
I don't like calling to MET/outreach team because I will be criticized for not looking after my patient well enough.	46.5	61.3	54.2	51.2	31.2	40.8	1.2	5.5	3.4	–	–	–	1.2	2.2	1.7	0.021	1.54 (±0.721)
MET/outreach calls reduce my skills in managing sick patients.	41.9	73.1	58.1	50.0	20.4	34.6	5.8	4.3	5.0	1.2	0.0	0.6	1.2	2.2	1.7	0.001	1.53 (±0.767)
Using the MET/NEWS system increases my workload when caring for a sick patient.	36.0	59.1	48.0	38.4	33.3	35.8	11.6	4.3	7.8	11.6	2.2	6.7	2.3	1.1	1.7	0.003	1.78 (±0.967)
If my patient fulfils the listed MET/NEWS criteria (triggers) but does not look unwell, I would not activate a MET/outreach team.	31.4	35.5	33.5	31.4	30.1	30.7	17.4	24.7	21.2	14.0	7.5	10.6	5.8	2.2	3.9	0.341	2.21 (±1.135)
Patient management																	
MET/outreach teams are required because the management of the patient by the doctors has been inadequate.	9.4	4.3	6.7	52.9	29.0	40.4	15.3	32.3	24.2	16.5	29.0	23.0	5.9	5.4	5.6	0.002	2.80 (±1.047)
MET/outreach teams are required because the management of the patient by the nurse has been inadequate.	9.4	12.0	10.7	62.4	34.8	48.0	14.1	35.9	25.4	9.4	12.0	10.7	4.7	5.4	5.1	0.003	2.51 (±0.995)

Strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, strongly agree = 5; Fi = Finnish nurses (n = 93); UK = British nurses (n = 86).
RRS = rapid response system; MET = medical emergency team; NEWS = National Early Warning Score; SD = standard deviation; UK = United Kingdom.

Table 3
RRS barriers and patient management sum variables' report, comparing the UK and Finland.

Item	UK		Finland		Total		P-value
	n	Mean (±SD)	n	Mean (±SD)	n	Mean (±SD)	
RRS barriers (computed variable, Cronbach's alpha value = 0.738)	86	1.91 (±0.597)	93	1.63 (±0.503)	179	1.76 (±0.567)	0.001
The MET/NEWS is not helpful in managing sick patients on the unit.							
I am reluctant to activate MET/outreach team for my patient because I will be criticized if they are not that unwell.							
I think that MET/NEWS is overused in the management of hospital patients.							
I don't like calling to MET/outreach team because I will be criticized for not looking after my patient well enough.							
MET/outreach calls reduce my skills in managing sick patients.							
Using the MET/NEWS system increases my workload when caring for a sick patient.							
If my patient fulfils the listed MET/NEWS criteria (triggers) but does not look unwell, I would not activate a MET/outreach team.							
Patient management (computed variable, Cronbach's alpha value = 0.740)	86	2.47 (±0.931)	93	2.82 (±0.877)	179	2.65 (±0.918)	0.003
MET/outreach teams are required because the management of the patient by the doctors has been inadequate.							
MET/outreach teams are required because the management of the patient by the nurse has been inadequate.							

Strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, strongly agree = 5.
UK = United Kingdom; MET = medical emergency team; NEWS = National Early Warning Score; RRS = rapid response system; SD = standard deviation.

Table 4
Correlation of the RRS barriers and patient management with age, work experience, and previous ICU/CCU work experience.

Nurses' demographic parameters	RRS barriers (computed variable)				Patient management (computed variable)			
	M (±SD)	B-coefficients (95% confidence interval), P-values	P-value		M (±SD)	B-coefficients (95% confidence interval), P-values	P-value	
			Univ.	Multiv.			Univ.	Multiv.
Work experience (years)			0.004	0.024			0.210	0.209
Less than 1	1.83 (±0.40)	0.45 (0.00; 0.91), p = 0.04			2.27 (±1.03)	−0.42 (−1.23; 0.38), p = 0.30		
1—2	1.92 (±0.56)	0.49 (0.08; 0.91), p = 0.01			2.63 (±0.85)	−0.20 (−0.94; 0.52), p = 0.57		
3—5	1.81 (±0.46)	0.49 (0.12; 0.85), p = 0.001			2.70 (±0.85)	0.07 (−0.57; 0.72), p = 0.81		
6—10	2.09 (±1.01)	0.62 (0.24; 1.01), p = 0.001			3.00 (±1.02)	0.17 (−0.51; 0.86), p = 0.61		
11—20	1.58 (±0.49)	0.12 (−0.17; 0.42), p = 0.39			2.52 (±0.90)	−0.35 (−0.88; 0.17), p = 0.18		
More than 20	1.51 (±0.32)	(ref)			2.70 (±0.92)	(ref)		
Age (years)			0.005	0.343			0.597	0.605
18—25	1.95 (±0.56)	0.06 (−0.04; 0.53), p = 0.78			2.56 (±0.99)	0.32 (−0.52; 1.16), p = 0.45		
26—35	1.83 (±0.56)	−0.17 (−0.05; 0.22), p = 0.39			2.61 (±0.86)	0.02 (−0.68; 0.73), p = 0.94		
36—45	1.74 (±0.59)	−0.02 (−0.37; 0.33), p = 0.90			2.84 (±0.98)	0.36 (−0.26; 0.98), p = 0.25		
46—55	1.73 (±0.60)	0.22 (−0.08; 0.51), p = 0.15			2.70 (±0.98)	0.14 (−0.39; 0.67), p = 0.60		
56 or more	1.44 (±0.33)	(ref)			2.54 (±0.85)	(ref)		
Previous ICU/CCU work experience			0.872				0.708	
Yes	1.71 (±0.44)	0.0 (−0.20; 0.20), p = 0.99			2.73 (±1.02)	0.11 (−0.25; 0.48), p = 0.53		
No	1.75 (±0.53)	(ref)			2.63 (±0.86)	(ref)		

Strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, strongly agree = 5.
(ref) = reference category; Univ. = univariate analysis; Multiv. = multivariate analysis; SD = standard deviation; RRS = rapid response system; ICU = intensive care unit; CCU = critical care unit.

decision-making model is positively linked to the number of times an RRS is activated by nurses.[41] Analytical mechanisms of an RRS should consider this issue further and provide clear evidence-based instructions in RRS models on how to deal with this situation.

6.2. RRS barriers

This study revealed that nurses still encounter a barrier before RRS activation: physician influence (i.e., calling the doctor before activating the RRS). This result aligns with findings from a systematic review.[27] However, other systematic reviews[27,42] have identified other barriers to RRS activation, such as "nurses' interaction with the RRS team or colleagues and its impact on workload". The interaction was defined as being hesitant to initiate an

RRS owing to fear of criticism for improper RRS initiation or being judged as not being able to manage the patient. However, our study's findings indicated that nurses did not perceive these as barriers. Following the findings of this study, we suggest that hospital managers, nurse managers, and educators support nurses' continuing development of clinical competence, focussing on improving nurses' confidence and the role of physician influence in nurses' RRS activation.

6.3. British nurses versus Finnish nurses

Finnish nurses were more likely than British nurses to activate the RRS when they were worried about a stable patient (a patient who is presenting normal vital signs). This difference could be attributed to the different RRS models that have been implemented

at the hospitals. In the Finnish RRS (MET), "worrisome" is one of the defined parameters for RRS activation. In contrast, "worrisome" is not a parameter for RRS activation in the British RRS (NEWS). When a patient has normal vital signs, the nurse has no evidence of clinical deterioration. Sensing clinical deterioration is the first step in RRS activation.[43] This scenario creates a dilemma for nurses' decision-making: whether to adhere strictly to the guidelines of the RRS model or trust their intuition and activate the RRS for a stable patient. Approximately half of the nurses did not report that they would use intuition as an indicator for RRS initiation. Intuition is the ability to recognise the patient's problem without conscious reasoning.[44] Benner's theory links intuition to the highest level of nurses' clinical competence expertise.[8]

Evidence from this study showed that approximately half of the nurses would not take action for RRS activation based on their intuition. This issue suggests that nurses may lack confidence in their competence. Confidence underpins nurses' clinical competence.[45] Our result was in line with the findings of a review[46] in which "being worried" was a cause of RRS activation in approximately one-fourth of cases. Several studies have documented the importance of intuition in RRS activation.[47,48] Nurses' "worry" could be a potential indicator of patient deterioration and could alert healthcare providers to seek timely intervention.[40] Welch et al[6] suggest that nurses' input may improve the RRS; however, nurses' worries and their clinical judgement have been neglected in RRS guidelines. Quality improvement framework studies and study of nurses' reflections on RRS events are suggested to investigate this matter further.[6]

6.4. Limitations

This study was limited to only two acute hospitals in the UK and Finland. Including additional countries and more study settings would have achieved a broader understanding of nurses' attitudes towards the RRS and increase the generalisability of the findings. The data collection tool has been used in different previous studies.[11,34—37] However, we found that internal consistency among all the items could be further developed, with only nine of the 16 having good internal correlation.

7. Conclusions

In this study, we focused on nurses' attitudes towards RRSs, which is one of the components of nurses' clinical competence for managing deteriorating patients. The findings are important to raise awareness of nurses' attitudes towards the RRS and identify attitudes that could act as facilitators or barriers in RRS activation. The study suggests that nurses' attitudes towards physician influence and intuition need to be improved through the development of continuing clinical competence. Deteriorating patients have a unique and complex clinical situation that demands an agreed-upon RRS that allows for nurse input and consideration of physiologic parameters.

Conflict of Interest

None.

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CRediT authorship contribution statement

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.aucc.2021.02.011.

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