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Why is Respiratory Rate the Neglected Vital Sign? A Narrative Review

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Abstract

Respiratory rate assessment is essential for detecting acute changes in a patient's condition. Despite this, research has shown that it is the most neglected vital sign in clinical practice. This literature review identified three key reasons for this: inadequate knowledge regarding respiratory rate assessment; nurses' perception of patient acuity; and lack of time. These factors suggest poor understanding of the importance of respiratory rate as a vital sign.

Although respiratory rate assessment is commonly neglected in clinical practice, only three studies have explored the reasons for this. It is not known what is taught at the undergraduate level regarding respiratory rate assessment. Whilst increased focus on respiratory rate assessment at the undergraduate level may improve nurses' awareness of this vital sign, more research regarding this clinical problem is needed.

Keywords

Vital signs, Respiratory rate, Assessment, Measurement, Neglect

Introduction

Assessment of vital signs is essential for detecting acute changes in a patient's condition. Vital sign assessment allows for the identification of signs of improvement or if the patient is deteriorating, alternate or emergency care to be initiated. Assessment of these clinical parameters plays a fundamental role in early detection of patient deterioration but only if nurses understand the basis of the signs, and they are measured, communicated and acted upon [1].

Despite the importance of vital signs monitoring, research indicates these signs are not consistently assessed, recorded or acted upon in the acute setting. Numerous studies have highlighted a lack of vital signs measurement in the hours immediately prior to life-threatening adverse events or admission to Intensive Care [2-4]. In a randomized trial of medical emergency teams in 23 Australian hospitals, more than 75% of patients experiencing an adverse event had at least one vital sign unrecorded immediately before the event [5]. Other studies have also shown that when vital signs are abnormal, clinicians' responses are often inadequate [6,7].

Respiratory rate (RR) as a key vital sign has numerous clinical uses. These include to obtain a baseline for comparison or post-operative monitoring, to identify blood transfusion or drug reactions, and to detect compensation to acid-base abnormalities [8,9]. A change in respiratory rate is also an early indicator of deterioration.

Early identification of this change allows prompt intervention and thus reduces the risk of organ failure and death [10]. Tachypnoea for example is one of the most significant predictors of in-hospital cardiac arrest and admission to intensive care [11]. The ability to identify a deteriorating patient is also essential for avoiding poor clinical outcomes and to ensure the effective intervention of rapid response teams [12].

Despite its clinical importance, respiratory rate has consistently been the least frequently measured vital sign [13-15]. An audit of 211 adult post-operative patients in five Australian hospitals for example found only 17% of medical records had complete documentation of vital signs, with respiratory rate the most neglected [16]. Similarly in a retrospective review of 1000 patients who died in 10 British hospitals, poor clinical monitoring was responsible for a third of preventable deaths [17]. This neglect of vital signs is not a new clinical problem and is yet to be adequately studied [18].

The failure to consistently assess or record respiratory rate is a concern as an abnormal respiratory rate is a predictor of serious adverse events and has been associated with a 13 fold increased risk of mortality [19,20]. Whilst the neglect of respiratory rate is not a new clinical issue, the reasons for this remain unclear.

Aim

The purpose of this review was to appraise research examining the clinical neglect of respiratory rate, in order to make recommendations for research and clinical practice. The review aimed to answer the question: why is respiratory rate the most neglected clinical vital sign?

Method

Databases were searched to identify studies which focused on respiratory rate as a neglected vital sign. Databases searched were CINAHL, MEDLINE, PUBMED and Google Scholar. Search terms used were: respiratory rate, measurement or assessment, charting or documenting or recording, neglect or omission. Inclusion criteria were primary research published in English since 2005. This publication date was chosen as the neglect of respiratory rate measurement is not a recent clinical problem and has been acknowledged in seminal literature. Exclusion criteria were non-empirical publications (e.g. editorials) and studies not published in English. Reference lists of studies meeting the inclusion criteria were also reviewed for other relevant studies. To ensure rigour of the review, identified studies were appraised using the Critical Appraisal Skills Programme checklists [21].

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Results

After inclusion and exclusion criteria were applied, three studies were identified for review (Table 1). Two of these studies were conducted in the United Kingdom, each in a single hospital. The third study was conducted in three hospitals in New Zealand. Quantitative and qualitative research methods were used. Study participants were registered nurses, student nurses, doctors and health care assistants. These staff worked in a variety of acute clinical areas including general medical and surgical wards (Table 1).

Patient acuity

The decision to assess respiratory rate was heavily based on nurses' perception of patient acuity. In 2006, Hogan [24] used focus groups of qualified nurses, health care assistants and student nurses in one British hospital. If the patient was deemed to be in a stable condition, nurses were less likely to measure the respiratory rate [24]. Ansell et al. [22] conducted one-off, semi-structured telephone interviews with 10 Registered Nurses working in adult wards in three hospitals in New Zealand. Half of the participants reported that respiratory rate assessment tends to be forgotten if the patient "looks comfortable" [22]. One nurse stated that if a patient was too agitated to have their respiratory rate accurately assessed, the respiratory rate would simply be estimated [22].

Inadequate knowledge/skills

Participants in Ansell's study also reported that the skills of respiratory rate assessment were not clearly demonstrated during their undergraduate studies [22]. One nurse stated "I can't remember being taught the rationale, you just did it as part of your observations" [22]. Some participants in Hogan's study stated that respiratory rate assessment and oxygen therapy were taught at the same time during their studies [24]. This resulted in the conclusion that only patients receiving oxygen therapy needed to have their respiratory rate assessed [24].

A study by Philip et al. involved 41 medical and nursing staff on medical and surgical wards at one British hospital [23]. An anonymous, self-reported questionnaire was used for data collection. A lack of training or knowledge was one of the key reasons respiratory rate assessment is neglected. Five respondents reported that staff do not think that respiratory rate is important. Some nurses had the perception that respiratory rate measurement was only important in certain patients [23].

Lack of time

A lack of time due to heavy workloads and concerns about completing important tasks resulted in some nurses neglecting respiratory rate assessment. Participants in Philip's study [23] reported they were unable to assess respiratory rates for 30 seconds or more due to time constraints or perceived lack of time. Others similarly reported that as measuring the respiratory rate takes more time than measuring other vital signs, priority is often given to other tasks considered more important [22]. This was particularly

an issue as there is no automated machine for respiratory rate assessment [22].

Other factors

Other factors contributing to the neglect of respiratory rate assessment were also reported. These however were not dominant themes across the reviewed studies and were only reported in single studies. These other factors were: laziness and not carrying a watch with a second hand [23], and interruptions during respiratory rate assessments [22].

Discussion

The recognition of nurses' failure to consistently assess and record respiratory rate is not a new issue. Research spanning more than two decades has highlighted the extent of this clinical problem. The dearth of studies examining the reasons for this is therefore quite surprising, particularly given the importance of respiratory rate assessment to patient outcomes. This review provides insight into why respiratory rate is often neglected in clinical practice and also questions the validity of respiratory rate recordings in observation charts.

The neglect of respiratory rate measurement is a concern given that vital signs assessment is a critical part of patient care. Respiratory rate assessment has many uses such as: to monitor fluctuations in a patient's condition or recognize acute changes, to indicate signs of deterioration and to recognize the need for treatment escalation [8]. Respiratory rate increases in hypovolemia and an increased respiratory rate can be an early marker of acidosis [25]. During clinical deterioration, compensatory mechanisms normally increase heart and respiratory rates first without significant changes in the blood pressure [26]. An abnormal respiratory rate is also common prior to cardiac arrest [27,28].

It is a key nursing responsibility to recognize and interpret physiological abnormalities [29,30]. However the ritualization of vital signs assessments within nursing cultures might contribute to their ad hoc measurement [31]. If nurses view a task as nothing more than part of their daily role, the "vital" component of vital signs might be forgotten. Senior nurses in one of the reviewed studies [23] reported the need for a culture shift towards nurses understanding the importance of accurate assessment including the knowledge base that supports it.

Some of this review's findings may reflect the delegation of certain nursing tasks such as vital signs assessment, to less qualified nursing staff or even non-nursing staff. Some participants in the reviewed studies for instance were health care assistants. This cultural shift suggests that vital signs are no longer perceived as being vital but are seen as 'just another task' that needs to be completed during a shift. Whilst this may be a pragmatic change in long term residential facilities, it creates a significant risk for patients in the acute setting. It has therefore been argued that vital signs 'get no respect' and should be renamed cardinal signs [32].

Nurses' perception of patient acuity is a key factor in compliance

Table 1: Reviewed studies.

Study	Sample	Method	Key findings
Ansell et al. [22]	Ten Registered Nurses from wards in three New Zealand hospitals	Semi-structured telephone interviews	• RR is missed if the patient looks stable or has been hospitalized long term • As RR cannot be measured by a machine, it takes more time to assess than other signs • Nurses are often interrupted when trying to measure RR • Experienced RNs believed they could visually assess a patient's condition • Not measuring RR in some wards was a culture not questioned by staff
Philip et al. [23]	13 nurses, 20 junior doctors, 3 student nurses and 5 health care assistants on medical and surgical wards at one British hospital	Anonymous, self-reported questionnaire	• Most respondents believed RR is a very good indicator of patient acuity • Common reasons for not assessing RR for at least 30 seconds were lack of or perceived lack of time, laziness and lack of training or knowledge • Staff reported patients who had abnormal RRs despite a normal rate being documented • Most respondents felt that RR is not counted for at least 30 seconds when it is assessed • Many staff think that RR is estimated or guessed
Hogan [24]	RNs, Health Care Assistants and student nurses at one British hospital	Focus groups	• Patient assessment was seen as a part of routine, ritualistic practice perpetuated by a task-orientated culture • Basic education about vital signs was inconsistent and sometimes learnt by observing others • Individual nurse's clinical judgement determined the frequency of vital signs assessment • There was a lack of clear guidance on who should measure vital signs on ward patients

with vital sign assessment. A systematic review similarly found that staff were more likely to be alerted to patient deterioration through intuitive judgement and used vital signs assessment to confirm this rather than vice versa [33]. In a study of vital signs assessment in a British emergency department, there was a significant relationship between the failure to record vital signs and lower triage categories [1]. This supports the finding of this review that nurses' perceptions of illness acuity influences their decision making about respiratory rate assessment. If the nurse deems the patient not to be acutely ill, it is likely the respiratory rate will not be assessed.

Research has explored why some key nursing care is missed or delayed [34]. The main reasons identified included: too few staff, poor use of existing staff resources, time required for the intervention, poor teamwork, ineffective delegation, habit and ritual [34]. Some of these factors, such as the time it takes to manually assess the respiratory rate, were found in this review. In a survey of 2917 nurses working in 46 hospitals in the United Kingdom, 86% reported one or more care activity tasks had be left undone in their last shift due to lack of time [35].

It has been suggested that staff may lack the knowledge and skills to safely care for deteriorating patients [36]. Up to 80% of cardiac arrests on general hospital wards for instance have been deemed preventable [37]; 40% of these are considered respiratory in nature [38]. This is possibly because 65% or more of in-hospital cardiac arrests are preceded by at least one abnormal vital sign [39]. Research also suggests that nurses may lack the knowledge and skills for performing a comprehensive respiratory assessment [40,41]. The failure of participants in the reviewed studies to value respiratory rate as a critical vital sign is consistent with these research findings. Nurses' failure to accurately measure, record and report vital signs therefore has a link to adverse clinical outcomes.

It is unclear why some clinicians perceive RR to be a less important vital sign. One possible explanation is that RR is not measured by a machine, unlike other vital signs. In a survey of 614 ward nurses, most reported relying on oxygen saturation to evaluate respiratory dysfunction [42] despite research showing that clinicians' knowledge of pulse oximetry is often poor [43]. A heavy reliance on technical equipment also suggests heavy workloads and challenges with time management. This implies that other nursing tasks were given greater priority and may reflect a lack of understanding of the importance of respiratory rate as a vital sign. In a qualitative study of ward nurses' experiences of caring for critically ill patients, being 'equipment focused' was a key finding [44]. The reliance upon equipment was often to the detriment of a holistic approach to patient assessment [44].

The majority of nurses in one of the reviewed studies believed that respiratory rate recordings are unreliable as it is not measured accurately due to a perceived lack of time [23]. This belief is supported by other research. In a study conducted in a North American tertiary referral hospital, medical students assessed patients' respiratory rates within an hour of them being measured and recorded by nursing staff [9]. In half of the 467 recordings made by nursing staff, the respiratory rate was 20 breaths per minute which was consistent with only 76% of the medical students' recordings. For respiratory rates of 12 or less, nursing staff were correct only 3% of the time, for rates greater than 23 breaths/minute, nurses were correct only 15% of the time [9].

In a similar prospective, observational study in six tertiary referral hospitals in the United States, respiratory rates of 18 or 20 breaths/minute accounted for 72% of all recordings, and documented respiratory rates were higher than directly observed measurements [45]. Other research has similar findings. In a study conducted in an 80 bed rural Australian hospital, 484 respiratory rate recordings were reviewed [46]. In 83% of cases, the recorded respiratory rate was 16 or 18 breaths per minute; some observation charts indicated the respiratory rate was always 18 [46]. The findings of all these studies suggest that respiratory rate measurements might be guessed or made up much of the time.

Limitations

Despite extensive research indicating that vital signs and respiratory rate in particular are not consistently measured and recorded, very few studies have explored the reasons for this. Only three studies examining the reasons why respiratory rate is neglected were identified for this review. These studies are limited by their small sample size or single study sites. Whilst this review has appraised the evidence available, the evidence is scant and limited in scope.

Participants in the reviewed studies were selected via purposive, non-probability sampling methods. Whilst these are valid qualitative research methods, it limits the generalizability of this review's findings. Participants in two of the studies included nurses and other health care professionals. Whilst this could be considered a strength, the opinions of clinicians who do not actually assess vital signs as part of their role may represent anecdote only.

Implications for Practice

With adequate education, the influence of some of the key factors contributing to the neglect of respiratory rate assessment might be eliminated. Whilst staff in acute clinical settings often have heavy, competing workloads, if the importance of respiratory rate assessment was understood, it might be given greater priority in routine care. Highlighting the importance of respiratory rate in nursing education programs might help create this change. Clinical staff involved in acute care delivery also need to be educated on the importance of respiratory rate assessment. This also needs to be understood by graduating nurses who represent the future nursing workforce. The main question is, what is the best way to teach and assess the importance of respiratory rate assessment to nursing students and the current nursing workforce? Research is needed to address this pedagogic issue.

Whilst the three reviewed studies had some similar findings, more clinical research involving larger samples and nurses from varying clinical settings is needed. For example, a study comparing the opinions of nurses from differing clinical disciplines (eg medical vs surgical, general wards versus high dependency) might further the current understanding of why respiratory rate is neglected. If one group of nurses, such as those working in high dependency areas, is found to have a better understanding of respiratory rate assessment, the reasons for this might be helpful for the education of all nurses.

Conclusion

Respiratory rate is an important indicator of acute illness. Despite this, many studies have highlighted that respiratory rate measurement is frequently neglected in clinical practice. Only three studies have explored the reasons for this. These reasons primarily relate to a lack of understanding regarding the importance of respiratory rate as a vital sign. Addressing this issue at the undergraduate and postgraduate levels might help address this problem.

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