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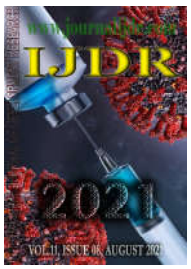

REVIEW ARTICLE OPEN ACCESS

HEALTHCARE APPLICATION: SEARCH FOR A TOOL FOR BEDSIDE DECISION MANAGEMENT IN RESPIRATORY FAILURE: AN INTEGRATIVE REVIEW STUDY

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ABSTRACT

To identify in the literature publications that may justify the use of this tool at the bedside for the management and resolution of the applicability of noninvasive ventilation in respiratory failure. This is an integrative review (integration of opinions, analysis of decision making, whose method, with the focus on evidence-based health care, is to review methods, theories, and/or empirical studies on a particular topic. The search for data was conducted in the following databases: MEDLINE/PubMed, Web of Science, Scopus and Cochrane. The results are 240 studies were identified in the databases, and 3 were included for analysis of the variables. It is suggested that through what emerged as a limitation in the results found, the next studies related to the theme are able to find answers regarding the emergence of tools that may provide ventilatory management technology to critically ill patients with respiratory failure.

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INTRODUCTION

The advent of technology in support of bedside decision making makes the advancement in management and monitoring of patients in care one of the great tools for clinical decision making and the inclusion of its utility can be evaluated from the perspectives of the services and functions they perform (Barra *et al.*, 2017; Paradis *et al.*, 2018). The process is defined with the inclusion of real-time decisions in the hospital environment, with remote access and use of applications, contributing to the solution of problems and health needs in different geographic regions, promoting a wide coverage of specialized health care performed in large hospital centers (Barra *et al.*, 2017; Liang *et al.*, 2018; Scala & Pisani, 2018; Guyton & Hall, 2017; Rajesh *et al.*, 2020).

The clinical picture of respiratory failure is characterized by increased respiratory rate, increased ventilatory effort with nose wing tapping, supraclavicular, intercostal, subcostal and suprasternal draught, increased use of accessory respiratory muscles, paradoxical pattern of the abdomen. In more advanced stages of ARF, lowering of the level of consciousness and fatigue of the ventilatory muscles can occur (Guyton & Hall, 2017; Rajesh *et al.*, 2020). The growing insertion of technologies based on the *webOvas* area of health education reveals in the dynamics of online learning, in order to make access in modern health flexible (Barra *et al.*, 2017; Liang *et al.*, 2018, Belisario *et al.*, 2013; Duggan *et al.*, 2018; Cox *et al.*, 2017). In this new scenario, virtual objects offer an opportunity for clinical dynamics in the teaching and learning process in health and well used for hospital bedside routines. This technology proposed in this study can be defined as a clinical digital resource that can be used to support procedures, outlined under a perspective of integrated planning to the

learning process that the market needs so much (Scala & Pisani, 2018; Guyton & Hall, 2017). Some factors favor the use of technology in health care, such as: flexibility, simple construction, reusability, easy upgrading, clinical interoperability, and ease of use for health professionals at the bedside (Scala & Pisani, 2018; Guyton & Hall, 2017; Rajesh *et al.*, 2020; Belisario *et al.*, 2013). The creation of software that supports clinical decision making at the bedside makes the professional involved to think about the best moment to apply the procedure, avoiding risks associated with the postponement of the technique, thus making the decision more justified and with the support of technology, which may help in a better outcome for the patient. It is important to think how this technology may help through the results that may be presented, contributing to a possible orientation and adequate management with a patient who is presenting acute respiratory failure (Scala & Pisani, 2018; Belisario *et al.*, 2013; Duggan *et al.*, 2018; Cox *et al.*, 2017; Silva *et al.*, 2018; Cunha, 2014; Ursi & Galvão, 2006). With the lack of the proposed theme, this review aims to identify in the literature publications that can justify the use of this tool at the bedside for the management and resolution of the applicability of noninvasive ventilation in respiratory failure.

METHODS

This is an integrative review (integration of opinions, analysis of decision making, and evidence-based health focus method), which is to review methods, theories, and/or empirical studies on a particular topic. The integrative review makes communion with other searches for the area of knowledge, incorporating education and health by facilitating the ability to systematize scientific knowledge with a greater approach of the researcher by the area that he wants to explore, developing a scenario by which one wants to know the evolution of the proposed theme over time, in addition to glimpse possible research opportunities later (Cunha, 2014; Souza *et al.*, 2010). Given these issues a research question arises, are there health applications that manage respiratory failure and help the health care professional verify the effectiveness of noninvasive ventilation and make decisions?. The finding of the guiding question is the phase that identifies the review, since it determines which studies will be included and the means adopted for the identification and the information collected from each study selected (Souza *et al.*, 2010).

Integrative review steps

2nd Step: Establishing inclusion and exclusion criteria.

After the researcher had chosen the theme and created the research question, a search in the databases began to identify the studies that will be included in the review. This step will be associated with the design performed in the previous step, because a widely presented problem can make the sample extremely varied, requiring greater discretion during the analysis (Souza *et al.*, 2010).

The inclusion criteria of the studies will be: original research, literature reviews (systematic, integrative or narrative), published from January 2017 to January 2021, this temporal context demonstrates a plan of advance since the English and Spanish languages; we note that large areas of activity as physiotherapy, nursing and medicine, and are fully available to theme the construction of these applications in health. The verification of the literature regarding the use of health applications with ventilatory care has made explicit the proximity of technology to the management of pulmonary disorders related to respiratory failure. The exclusion criteria will be: duplicate studies, abstracts, theses, dissertations, opinion articles, comments, Undergraduate Theses (UT), experience reports, reflection studies, management reports, epidemiological bulletins, congress annals. A base will be delineated for the registration of the data, guarantying the scope of the contemplated in the following order: title, databases, authors, year, type of publication, objective, method, interventions performed (Ursi & Galvão, 2006).

3rd Step: Identification of the pre-selected and selected studies.

In the imminence of identifying this study, we carefully read the titles, abstracts, and keywords of all publications located by the search strategy, and then ascertained their adequacy to the inclusion criteria of the study. In cases where the title, abstract, and keywords were not sufficient to define the selection, the search for the full article was extended. From the conclusion of this step, a table was designed with the pre-selected studies for the integrative review.

4th Step: Categorization of the selected studies.

The fourth step summarized and documented the information obtained from the publications found in the previous steps.

Figure 1. Presentation of the search strategy/equation

Mesh PubMed / Medline Descriptors
mobile applications AND physiotherapy AND nursing AND medicine AND cell phone AND smartphone AND noninvasive ventilation OR noninvasive ventilation OR acute respiratory failure AND emergency OR emergency AND intensive care unit OR intensive care unit AND emergency department OR emergency department AND nursing
Web of Science Descriptors
mobileapplications AND physiotherapy AND nursing A ND medicine AND cellphoneAND smartphoneAND nonin vasive ventilation OR noninvasive ventilation OR acute respiratory failure AND emergency OR emergency AND intensive care unit OR intensive care unit AND emergency department OR emergency department AND nursing
Scopus Descriptors
App AND nursing OR nursing AND medicine OR med icine AND emergency OR emergency AND noninvasive ventilation AND ventilation OR non AND invasive AND ventilation AND acute AND respiratory AND failure OR acute AND respiratory AND failure AND emergency AND department OR emergency AND department AND
Cochrane Descriptors
mobile applications AND physiotherapy AND nursing AND medicine AND cell phone AND smartphone AND noninvasive ventilation OR noninvasive ventilation OR acute respiratory failure AND emergency OR emergency AND intensive care unit OR intensive care unit AND emergency department OR emergency department AND nursing OR web OR area.

5th Step: Analysis and interpretation of the results

This step brought the discussion of the results related to the texts presented in the reviews, where guided by the findings the interpretation of the data was performed.

RESULTS

Figure 2. Identification

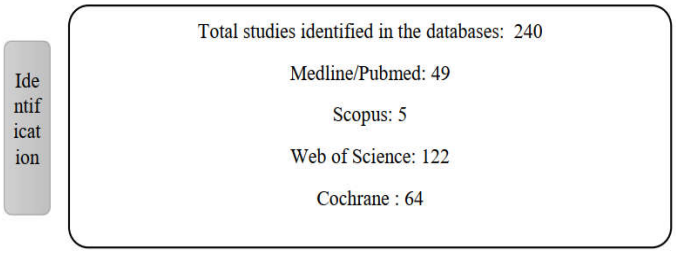


Figure 3. Table of Evidence

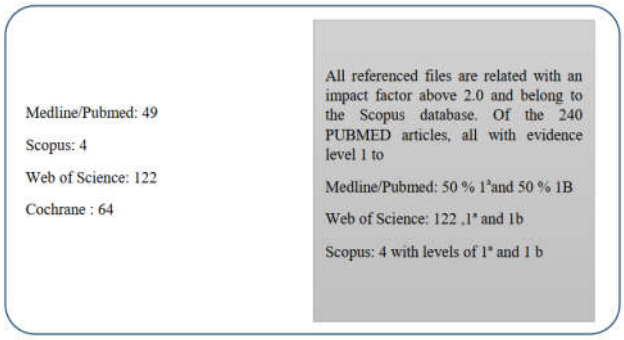
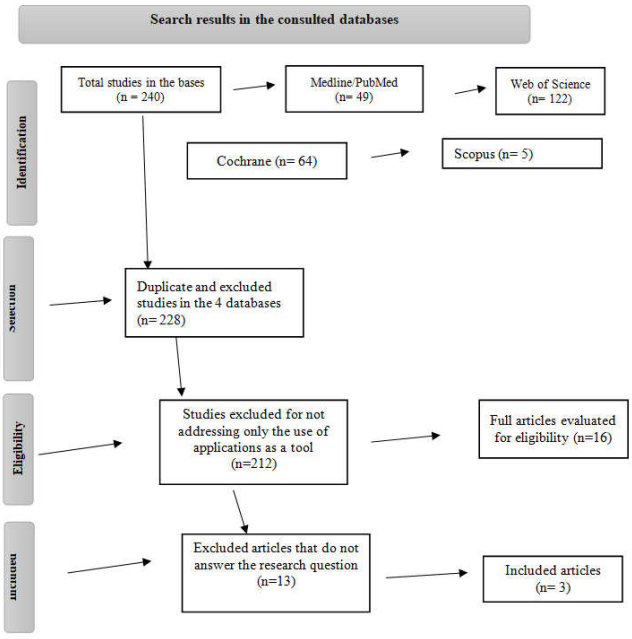


Figure 4. Prism Flowchart



associated with the processes that are adopted (Rajesh *et al.*, 2020; Belisario *et al.*, 2013; Duggan et al., 2018; Cox et al., 2017; Advanced Distributed Learning Initiative, 2004; Pai *et al.*, 2004). In the advent of the use of software for decision making at the bedside, applications are suggested and have been presenting feasibility of implementation regarding their inclusion in the ventilatory care modality, prototypes can provide valuable information of anticipated support, needs assessment and intervention for the ICU's (Intensive Care Unit) and hospital emergencies, associated with outcomes of better care to the critically ill patient, decreased hospital length of stay and mitigation of hospital costs (Cox *et al.*, 2017; Silva *et al.*, 2018; Cunha, 2014; Ursi & Galvão, 2006; Souza *et al.*, 2010; Hasan, 2008; Yeh *et al.*, 2005; Gerber *et al.*, 2005).

In a review study involving 17 randomized clinical trials with the participation of 1264 patients who presented with acute respiratory failure, it was observed that noninvasive ventilation reduced by half the percentage of mortality associated with the need for invasive mechanical ventilation (Guyton & Hall, 2017; Rajesh *et al.*, 2020).
The impact of the use of this resource is becoming something that innovates the professional performance supported in the literature as a new tool that generates quality service, the use of smart devices is particularly high among the community of health professionals, who report the use of health applications on their personal devices for clinics and continuing education activities (Fitzgerald *et al.*, 2017; Paradis *et al.*, 2018). With the search performed in the literature, the studies presented corroborate each other when it comes to ventilatory intervention in the treatment of lung diseases, and the scarcity of mobile technology in the management of this disorder (Berbenetz *et al.*, 2019; Osadnik *et al.*, 2017; Kopsa *et al.*, 2020). The studies agree on the use of oxygen and noninvasive ventilatory therapies that are presented as the first line of intervention for ventilatory care, indicating reduced mortality rates and better outcomes regarding the improvement of oxygenation through gasometric examination (Berbenetz *et al.*, 2019; Osadnik*et al.*, 2017; Kopsa *et al.*, 2020). It follows as a mode of decision making regarding the use of noninvasive ventilation the verification of vital signs, clinical condition and pathophysiological characteristics of pulmonary and cardiovascular disorders such as chronic obstructive pulmonary

Figure 5. Table with the characteristics of the included studies

Title	Databases	Authors	Year	Type of publication	Objective	Method	Interventionsperformed
Noninvasive positive pressure ventilation (CPAP or bilevel NPPV) for cardiogenic pulmonary oedema (Review)	Cochrane Database of Systematic Reviews	Berbenetz *et al.*	2019	Review	To evaluate the safety and efficacy of noninvasive ventilation in comparison with conventional care of patients with acute pulmonary edema	Randomized clinical trial studies were included.	Comparative Analysis of Noninvasive Ventilation versus Conventional Treatment in Acute Pulmonary Edema.
Oxygen therapy in the pre-hospital setting for acute exacerbations of chronic obstructive pulmonary disease (Review)	Cochrane Database of Systematic Reviews	Kopsa*et al.*	2020	Review	To analyze the effect of different levels of ventilatory support in ("high flow" compared to the pre-hospital environment	Randomized clinical trial studies were included.	Oxygen Utilization at Different Supply Levels in the Treatment of Exacerbation of Chronic Obstructive Pulmonary Disease.
Noninvasive ventilation for the management of acute hypercapnic respiratory failure due to exacerbation of chronic obstructive pulmonarydisease (Review)	Cochrane Database of Systematic Reviews	Osadnik *et al.*	2017	Review	Compare the effectiveness of NIV applied to exacerbated chronic obstructive pulmonary disease with measures that do not use ventilation in treating the disease.	Randomized clinical trial studies were included	Comparison of the effects of NIV at two pressure levels Vs conventional treatment including supplemental oxygen, antibiotics, bronchodilators, steroids in Chronic Obstructive Pulmonary Disease.

DISCUSSION

The rapid evolution of technologies in health provides a better for the population, the management of decisions by health professionals can be observed in software extensions of the most diverse devices among the smartphones and tablets available in the market, and in these instruments are packaged the so-called applications. The large-scale access to the internet with the omnipresence of mobile devices presents a unique opportunity to collect and collect data in a broad way in the most varied clinical situations encountered by a large portion of health professionals in their assignments with the speed necessary to take action, and it is clear that success or failure may be

Disease in exacerbation and acute cardiogenic pulmonary edema (Berbenetz *et al.*, 2019; Osadnik *et al.*, 2017). Increased estimates of the use of noninvasive ventilatory support to beneficial outcomes are expressed in reduced mortality, lower rates of orotracheal intubation, attenuated length of stay, and optimized hospital discharge (Berbenetz *et al.*, 2019; Osadnik *et al.*, 2017; Kopsa *et al.*, 2020). Studies corroborate that an enterprise of this nature becomes an object of research for larger organizations when it comes to investment capacity. In this sense, the presentation of results, monitoring, follow-up and decision making at the bedside for health professionals becomes more robust and reliable, aiming at the management of ventilatory conditions of a critically ill patient (Kopsa *et al.*, 2020).

FINAL CONSIDERATIONS

Given the international diversity of clinical studies currently published in journals indexed in the databases searched in this study, we noticed the great scarcity of publications related to the use of ICTs in the process of respiratory failure management at the bedside through mobile technology. Most of the time, the publications were restricted to evaluation reports of clinical efficacy in the indication of noninvasive ventilatory support at the bedside to prove the results of its application. The main contribution of this study was to identify research with sufficient levels of evidence to demonstrate the need to develop new studies to deepen this theme, in order to identify the impact of its clinical application on transdisciplinary health learning in the most diverse areas of health. It is suggested that through what emerged as a limitation in the results found, the next studies related to the theme are able to find answers regarding the emergence of tools that may provide ventilatory management technology to critically ill patients with respiratory failure.

CONFLICT OF INTEREST: This article presents no conflict of interest.

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