

# The role of the human dimension in organizational agility: an empirical study in intensive care units

Human  
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## Abstract

**Purpose** – The purpose of this paper is to analyse the role of hospital leaders and high-performance work practices (HPWPs) in intensive care units (ICUs) in organizational agility and its impact on healthcare personnel satisfaction.

**Design/methodology/approach** – This study was carried out in three ICUs of an important Spanish public hospital, one for adults, one paediatric and one neonatal. The unit of analysis was ICUs personnel (324 individuals: 14.5%, 48.8% and 36.7% from the categories of doctors, nurses and nurses' aides, respectively) who were invited to participate in the study. The sample had 248 individuals, with a sampling distribution by categories that was quite similar to that of the population. To test the hypotheses proposed, structural equations modeling (SEM) were used as the maximum likelihood estimation method.

**Findings** – The results confirm the proposed model and reveal the importance of the human dimension in ICUs on hospital agility and performance in terms of satisfaction of the clinical staff working in this area.

**Originality/value** – This paper is original because it analyses units of high complexity, such as ICUs from a management and non-clinical perspective. In addition, it studies the role of hospital managers and HPWPs on employee outcomes, as well as in-hospital responsiveness in a very dynamic context that demands agility on the management approach.

**Keywords** Agility, Leadership, Human resources practices, Healthcare personnel satisfaction, Hospital, ICU  
**Paper type** Research paper

## Introduction

Settings where organizations currently carry out their activities are increasingly unpredictable, turbulent and complex (Uhl-Bien and Arena, 2017). In light of this fact, organizations must act dynamically from a systemic, long-term perspective. Thus, today's context calls for a new management paradigm oriented towards agility (Labaf and Bigdelli, 2015). Based on this paradigm, the organizational activity must respond rapidly and flexibly to changes in the environment and have the capacity to manage situations of uncertainty (Sharifi and Zhang, 1999; Sherehiy *et al.*, 2007). In this regard, more studies are necessary to analyse the factors that determine organizational agility in the health sector (Suresh and Patri, 2017).

In particular, the role of the personnel in organizational agility is a requisite to successful performance, given that individuals in organizations must be committed to and prepared for change, as stated by Nijssen and Pauwe (2012). Therefore, it is easy to understand why the role of the human factor in organizational agility is addressed in the literature (Harraf *et al.*, 2015; Mooghali *et al.*, 2016). Specifically, Walsh *et al.* (2002) analysed the role of human resource management (HRM) in organizational agility in the public and private sectors. In this regard, hospitals, as organizations, are not exempt from the role played by the human dimension in organizational agility. Hospitals are complex institutions that offer multiple services where the employees and the relationship between departments and units are critical



factors for successfully providing health services (Chang *et al.*, 2013; Lee, 2016). In this sense, Nembhard and Tucker (2011) point out that healthcare professionals face great complexity, uncertainty and dynamism in their daily work due, among other things, to advances in medicine and technology and the variability of patient response to treatments. In this context, the agility is vital, hence the growing interest in studying the elements that contribute to increasing hospital units' agility, including the role of the human component, as shown in Pipe *et al.* (2012).

Specifically, the study of intensive care units (ICUs) as complex work areas that present a high level of uncertainty is of particular interest (Backes *et al.*, 2012). ICUs are highly specialized units that offer 24-h clinical care to critical patients whose evolution is changing and unpredictable. They also demand high-qualified professionals with high environmental dependence on resources and services from other hospitals and out-of-hospital sources (Valentin and Ferdinande, 2011; Van der Sluijs *et al.*, 2017). Thus, ICUs are dynamic, complex and interdependent systems of internal and external hospital personnel that require agility and where professional performance is the key to the service's success (Nascimento *et al.*, 2013; Massaroli *et al.*, 2015). Therefore, it is important to analyse the relationship between the human dimension in ICU and agility in hospitals, providing solutions from the services literature. Thus, this research analyses ICUs from a service management perspective and helps to close the gap in the literature on the management of ICUs. Another contribution to academic literature, in general, is the empirical validation of theoretical proposals about the novel concept of organizational agility.

Based on the above, the objective of this study is to validate a model in which the human dimension influences both the organizational agility and employee satisfaction. In this model, the human dimension is analysed from the perspective of high-performance work practices (HPWPs), considering as an antecedent of them, the leadership exercised by the hospital's top management. From this point on, the article begins by explaining organizational agility as a management criterion for hospital units in dealing with both external changes and internal needs. Next, the model is proposed, hypotheses are justified and then the methodology and analysis of the results are presented. Finally, conclusions stemming from the study carried out in this article are described.

## Literature review

### *Organizational agility as a management criterion in hospital units*

Agility is an organization's capacity to adapt to dynamic and turbulent environments, reducing threats and maximizing opportunities that can take place in new scenarios that arise (Appelbaum *et al.*, 2017; Baškarada and Koronios, 2018). Therefore, agility is associated with concepts related to the organization's stability in the presence of changes, such as speed, flexibility or the organization's capacity to respond (Santos Bernardes and Hanna, 2009; Roberts and Grover, 2012).

The healthcare system is composed of a network of inter-related parts (primary care centres, hospitals, rehabilitation units) that interact in a non-linear way at different levels (patient, family, medical centres, government), and they often produce undesired consequences (e.g. adverse reactions to treatments, re-hospitalizations) (Lipsitz, 2012). This complexity justifies the need to implement organizational agility as a management criterion in hospital units, as stated by Pipe *et al.* (2012). Indeed, healthcare systems are human organizations that mix different professionals and disciplines, where cooperation and interdependence take precedence over individuality and flexibility and adaptation over rigidity (Martínez-García and Hernández-Lemus, 2013).

ICUs represent areas of the hospital that offer integral care, seeking to improve patients' health with life-sustaining treatments, as well as providing palliative care at the end of life for

a dignified death (Cook and Rucker, 2014). This situation needs the teamwork of highly qualified professionals from different disciplines within the unit, from other units (pharmacies, x-rays, analytical, emergency) or out-of-hospital (other hospitals, service providers) (Marshall *et al.*, 2017; Van der Sluijs *et al.*, 2017). Moreover, ICUs make intensive use of highly sophisticated technology (Wikström *et al.*, 2007), and so, they are constantly dependent on technological innovations in order to improve the quality of the service. Thus, the study of ICUs to agile hospitals is justified by their complexity, dynamic nature and dependence on internal and external resources.

*The role of the human dimension in hospital agility*

The active role of the human dimension in achieving organizational agility at the level of both management and the rest of the staff is widely mentioned in the literature (Crocitto and Yousef, 2003). Organizational agility produces essential results in terms of economic and non-economic performance, including its impact on the attitudes of employees (Sanadgol, 2014; Nafei, 2016). This effect is even more relevant in ICUs, which typically involve a high level of human contact with considerable interaction among patients, relatives and healthcare staff, especially physicians and nurses. Thus, due to the importance of healthcare personnel in the success of the ICU (Nascimento *et al.*, 2013; Massaroli *et al.*, 2015), it is necessary to study how the human dimension – leadership and HPWPs – influences the hospital’s agility, as both an antecedent and an outcome of performance linked to the employee. Figure 1 shows the different hypothesis proposed in this study.

*Hospital leadership and HPWPs*

Leadership is management’s skill in providing guidance and vision, recognizing and encouraging individual abilities, and inspiring employees to commit to achieve the organizational objectives (Idris and Ali, 2008). In this regard, Al Harbi *et al.* (2019) state that leadership performs a key role in employees’ attitudes towards organizational goals. Moreover, leadership formulates future visions, promotes their followers’ innovation and creativity and improves employee motivation. McAlerney (2006) recognizes the importance of leadership development in the context of inherently complex healthcare organizations where leaders must respond to multiple stakeholders and different performance goals.

HPWPs describe a group of different but interrelated practices that select, develop, retain and motivate employees, with the capacity to generate added value for the organization

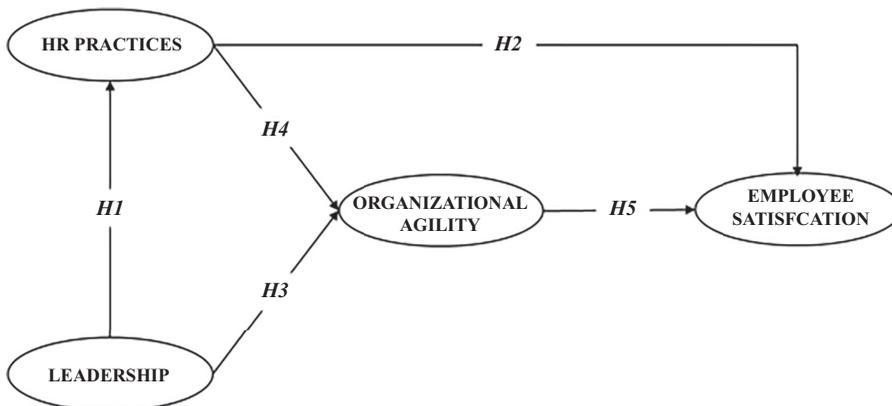


Figure 1.  
Proposed model

(Luna-Arocas and Camps, 2007; Guthrie *et al.*, 2011; Mihail and Kloutsiniotis, 2016). Thus, Selden and Sowa (2015) state that HPWPs reduce voluntary turnover, thereby increasing service quality. Regarding the fundamental aspects or dimensions demanded by current HRM, the HPWPs proposals are, for example, extensive continuous training, employees' participation and multidirectional communication (Guthrie *et al.*, 2011; Lee *et al.*, 2012). The adoption of HPWPs in the healthcare sector is recognized in the literature (Fan *et al.*, 2014; Mihail and Kloutsiniotis, 2016). In this regard, the literature emphasizes the importance of effective management of healthcare personnel working in ICUs through training (Sandahl *et al.*, 2013), participation and decision-making (Dorgham and Mahmoud, 2013), and rewards (James *et al.*, 2015), among others. Gittell *et al.* (2010) state that HPWPs influence on the quality and efficiency outcomes for patients by relational coordination. They suggest that these practices are predictors of relational coordination in order to achieve better clinical results in interdependent work contexts.

The study of how the effective leadership of hospital managers contributes positively to the HRM in ICUs constitutes a topic of research of growing interest in literature. In this regard, senior management should be committed to service quality and work collaboratively with all members of the organization. For example, Hopkins *et al.* (2007) developed a respiratory ICU based on an improvement culture, which required substantial changes to patient care in ICU. Despite being an innovative system for patients and hospital management, the unit received the necessary managerial support. In addition, hospital management could encourage innovation and improvement in ICUs. Thus, Bai *et al.* (2018) highlight the role of operational research/management science in identifying efficient methods to manage the ICU to ensure quality of service. Consequently, hospital management must promote innovation culture and foster continuous training of new methods to improve ICU patient care (Hackner, 2010a; Reader and Cuthbertson, 2011; Silva *et al.*, 2018). Likewise, hospital managers as effective leaders could influence employees and the work they perform in the ICU by increasing their participation in management. Thus, Oerlemans *et al.* (2018) propose the use of the Delphi method as a useful tool for hospital management to identify critical attributes for care quality to patients in any hospital unit and especially in ICU. For example, meeting the needs of patients' families requires the capacity to listen to and support them. To this end, the authors propose a sustained dialogue between ICU and hospital management on care quality provided to patients and relatives. Furthermore, hospital management could encourage staff participation in organizational plans and goal setting by developing working teams or committees, among others. From this perspective, Parand *et al.* (2014) note that achieving quality outcomes in hospitals demands continuous management and intensive staff relationships. For example, hospital managers could promote ongoing coordination efforts between the Board and medical staff in establishing the organizational quality strategy. ICU is a service with special and complex needs, and hospital managers require ICU personnel participation to determine plans, objectives and resources of this unit, as well as basic demands on other units to which they are directly related (e.g. pharmacy, laboratories). Recently, Clay-Williams *et al.* (2019) advocate this idea and highlight the need to have a team of clinically influential leaders in-hospital and ICU executive members to discuss the implementation of a new system in-hospital. This system aimed to determine a set of rules to help make decisions in ICU, as well as to improve relations between patients, the surgery department and ICU. To achieve this goal, the authors state that it is necessary to enhance cohesion by using a multidisciplinary meeting to evaluate the status of ICU according to the plan.

In respect to the influence of leadership on the design of human resources practices (HRPs), the management literature provides some evidence. Thus, Pons-Verdú and Ramos-López (2012) point out that these two concepts are closely related because the organization management has the responsibility to design the HRP. In this sense, Knies *et al.* (2018) show

that frontline managers can make an important contribution to mission achievement by supporting the implementation of HRP. [Smith et al. \(2015\)](#) emphasize the need for an effective leader in dynamic contexts to foster improvement and continuous change and empower talent, motivate staff and listen actively. In this regard, [Hodgetts \(2011\)](#) states that effective leaders in hospital management should promote ongoing relationships with other organization members, thus encouraging staff participation. Moreover, [Stockwell and Slonim \(2006\)](#) argue the need for ICUs to have effective leaders in order to foster teamwork and engage health workers through strategies and goal achievement to improve the quality of patients' care and safety. In addition, [Martin et al. \(2014\)](#), in a study involving healthcare staff of ICUs, determine the need to have effective leaders who make a commitment to communicating and have a shared vision, contributing to greater collaboration and improvements in the quality of patients' care and safety. In this regard, [Lee et al. \(2016\)](#) also refer to effective leadership when they allude to leadership capable of dealing with the environment and commitment to innovation and continuous improvement. They analyse the role of effective leadership in the hospital environment and use the term "hospital leadership", which we adopted in this research. From the above discussion, this study proposes in hypothesis **H1** that hospital leadership influences on HPWPs design applied in ICUs.

*H1.* Hospital leadership positively and directly influences HPWPs.

#### *HPWPs and employee satisfaction*

The next hypothesis (**H2**) proposes a positive effect of HPWPs on employee satisfaction. As a conceptual basis for this premise, [Macky and Boxall \(2007\)](#) find that if the organization puts more HPWPs into effect, the employees are more satisfied. [Nazneen et al. \(2018\)](#) empirically demonstrate that employees' job satisfaction is positively correlated with HRP like training, performance appraisal, team working, employee participation and compensation. In this regard, [Li et al. \(2019\)](#) point out that organizations must create a work environment that conveys to employees that they are valuable to the organization and taken into account by senior management. Thus, the authors identify some HRP such as continuous training, the employee's participation in work commissions and receiving performance evaluations, among others, to improve employee well-being. From the study by [Zhang et al. \(2018\)](#), it can be explained that when the organization invests in HRP that benefit employees, they respond positively with positive behaviours and attitudes, such as job satisfaction and organizational commitment. This reasoning finds theoretical support in social exchange theory ([Birtch et al., 2016](#); [Zoller and Muldoon, 2019](#)), which states that employees will show a positive attitude towards the organization if they find that the organization is beneficial to them. [Brink et al. \(2019\)](#) also theoretically and statistically confirm the influence of HPWPs on employee satisfaction. Thus, these authors find that higher employee involvement, higher promotion and career development and more autonomy result in higher job satisfaction. Moreover, they establish that the relationships between HPWPs and organizational performance can be mediated by employee outcomes. The positive influence of HRP on employees has also been justified in the literature on healthcare, based on the reciprocity of employee–employer relations ([Fan et al., 2014](#); [Almaaitah et al., 2017](#)). Hence, the influence of HRP on employee attitudes in healthcare organizations finds meaningful academic support ([Lee et al., 2012](#); [Zhang et al., 2013](#); [Fan et al., 2014](#)). Thus, [Ogbonnaya and Validaze \(2018\)](#) confirm the positive influence of HRP on employee outcomes, such as job satisfaction and employee engagement in healthcare. In the same vein, [Vermeeren et al. \(2014\)](#) empirically demonstrate the positive relationship between HRP and organizational performance in the healthcare sector, finding that employee satisfaction plays a fundamental role as a mediator variable in this relationship. However, the lack of studies about the effects of HPWPs on healthcare' personnel satisfaction on ICUs justifies their analysis in this research. Moreover,

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different studies highlight the role of ICU personnel in the service quality (Oerlemans *et al.*, 2018). Taking the aforementioned studies as a reference, hypothesis H2 is formulated as follows:

H2. HPWPs positively and directly influence employee satisfaction.

#### *Hospital leadership and organizational agility*

Today's organizations require proactive and sensitive managers with strong technical and relational capabilities. Thus, Harraf *et al.* (2015) indicate that in agile structures, the leaders have a defined business vision and direction that the members of the organization are excited by and share. In the configuration of agile organizations, Crocitto and Youssef (2003) point out that leaders are essential in promoting organizational learning and acceptance of change. Vinodh *et al.* (2012) add to this thesis that the type of management stimulates organizational agility. More specifically, they establish, for example, the need for a participative management style and the importance of employee awareness of management's objectives. In this regard, the latest version of the EFQM Excellence Model 2013 (EFQM, 2012) defends leadership as a key factor in the capacity to deal with situations of change and uncertainty (EFQM, 2012). Therefore, ICUs need effective leaders who are engaged and motivate others to act on changes and adverse environmental conditions (Smith *et al.*, 2015). Moreover, because ICUs are interconnected areas in hospitals, they need overall effective support and cooperation (Marshall *et al.*, 2017). Therefore, effective hospital leaders, as members of middle and top management and clinical professionals (Rotar *et al.*, 2016), play an important role in improving organizational agility to facilitate the work in ICUs. Hence, the hypothesis H3 is formulated as:

H3. Hospital leadership positively and directly influences organizational agility.

#### *HPWPs and organizational agility*

Regarding the positive impact of HRM in contexts that require agility, Sumukadas and Sawhney (2004) recommend several formulas, such as fostering employee training to deal with enriched and redesigned jobs and using systems of monetary and non-monetary incentives. Harraf *et al.* (2015) indicate that employees involved in decision-making show less resistance to the changes demanded of agile organizations. Likewise, Mooghali *et al.* (2016) recognize that hospitals need to be agile in order to respond to dynamic environments, and they show that HRP favour employees' agility. Patri and Suresh (2017) state that motivated employees, a flexible workforce, cooperation between management and employees, training and implementation of employee's suggestion influence healthcare organization agility. In this regard, the complexity and dynamism of ICUs require organizational agility in order to ensure quality and patient safety. The ICU professional must always work quickly and effectively and make the right decisions in changing circumstances, as suggested by Nascimento *et al.* (2013) and Massaroli *et al.* (2015). Hence, we propose H4:

H4. HPWPs positively and directly influence organizational agility.

#### *Organizational agility and employee satisfaction*

In general, employees feel more satisfied when the organization has the processes and methods to develop the products and services that satisfy the clients' changing needs. In this regard, the agility must satisfy not only the clients but also the employees (Melnik and Maurer, 2006; Mohammadi *et al.*, 2015). Thus, Mohammadi *et al.* (2015) point out that agile organizations increase employees' productivity and motivation. Likewise, Melnik and Maurer (2006) observe that in software development teams, among other factors, agile

methods increase employees' satisfaction by improving communication among team members and with the customer, promoting continuous feedback and allowing developers to make decisions that affect them. In addition, Labaf and Bigdelli (2015) state that there is a positive and significant impact of organizational agility on employee efficiency and satisfaction. Similarly, Sanadgol (2014) finds a strong correlation between organizational agility (response capacity, competence, flexibility and speed) and employee satisfaction in the educational context. The lack of studies on the effects of organizational agility on ICU satisfaction justifies their study in this work. If the results of these studies are extrapolated to our context, hypothesis H4 can be formulated in this way:

H5. Organizational agility positively and directly influences employee satisfaction.

## Research methodology

### *Sample and participants*

This study was carried out in three ICUs of a Spanish public hospital, one for adults, one paediatric and one neonatal. In 2018, this hospital had around 4,850 employees and 27,800 patients, and more than 22,600 surgical interventions were performed. The intensive care service of the analysed hospital follows international quality standards and is accredited with ISO 9001. It has also received national and regional awards and recognition of the quality of its service. All of this confirms the suitability of the unit of analysis chosen. Following valid and accepted performance criteria, it represents a model to follow. The unit of analysis was ICUs personnel, and the size of the population consisted of 324 individuals (14.5%, 48.8% and 36.7% from the categories of doctors, nurses and nurses' aides, respectively) who were invited to participate in the research. The sample had 248 individuals, with a sampling distribution by categories that was quite similar to that of the population (see Table 1), which guarantees its representativeness and assumes a sampling error of +3.08% at a 95.5% confidence interval. This sample size represents a response rate of 76.54%.

The sample is characterized by being composed mainly of women (76.6%), aged between 36 and 50 years (60.5%), with more than 10 years of experience in the profession (83.5%) and five years in the ICU (75%).

### *Measures*

To collect the information, a self-administered personal survey was used, with 7-point Likert scales (from 1 strongly disagree to 7 strongly agree). A Delphi study was previously carried out with experts from the sector to assess the suitability of the scales proposed, and that a rigorous and comprehensive pre-test had been completed. The surveys were conducted in the workplace of the participants. In order to achieve the highest possible response rate, the members of the research team took responsibility for the fieldwork.

The items on the measurement scales are based on literature review and reflections of expert professionals. First, regarding the evaluation of the leader's role, they must firmly implement the corporate philosophy so that it is valued and followed by the entire hospital

Category	Population		Sample	
	N	%	n	%
Doctors	47	14.51	32	12.90
Nurses	158	48.77	122	49.19
Nurses' Aides	119	36.73	94	37.90
Total	324	100.00	248	100.00

**Table 1.**  
Distribution of the  
population and the  
sample by category

organization. In doing so, it is ideal for the personnel to participate in designing plans and setting objectives. Likewise, hospital managers have to be committed to service quality and a culture of innovation, encouraging continuous improvement and creativity in their employees in order to be prepared for change (Lakshman, 2006; Idris and Ali, 2008; Lee *et al.*, 2016). Moreover, the attributes included in this dimension are coherent with and based on the leadership philosophy and practices from the EFQM Excellence Model (2012). They have recognized importance in the healthcare sector (West *et al.*, 2015). The HRM scale is composed of four types of high-performance practices (training, participation, recognition and communication). Training is identified as an intensive system of formal training that collaborates in the employees' development process and covers technical and social skills (Guthrie *et al.*, 2011). Employees' participation evaluates their involvement in the company's information process, decision-making, or problem-solving activities and is based on authors such as Gallie (2013) and Mihail and Kloutsiniotis (2016), among others. Recognition is related to a stimulation and compensation scheme for the effort of the individual or group (Elmadag and Ellinger, 2017). Finally, communication analyses if the organization share business information (plans, objectives, mission) across different structural levels, as stated by Guthrie *et al.* (2011).

In the organizational agility scale, it was considered advisable to include aspects such as the organizational capacity to predict and respond quickly to changes (patient evolution, technological development, demand peaks). To develop this scale, proposals by different authors were considered, such as those by Sharifi and Zhang (1999), Sherehiy *et al.* (2007) and Roberts and Grover (2012). In addition, studies were reviewed that analyse agility in hospitals and ICUs, although it is a relatively unexplored area, especially the studies by Bottani (2010) and Pipe *et al.* (2012).

Employee satisfaction measures doctors, nurses' aides and nurses' attitudes and well-being in relation to their activities, and the scale used was based on authors such as O'Neill (2005) and Vermeeren *et al.* (2014). Thus, items were included related to the satisfaction of personnel with their jobs in ICUs and the degree to which they think their bosses and co-workers positively value their work. This scale aimed to measure ICUs personnel's feelings about their work and performance.

### *Analysis*

Before testing the hypotheses, it is necessary to analyse the dimensionality and psychometric properties of the measurement scales used to evaluate the constructs in the proposed model: (1) the application of HPWPs (HR); (2) the leadership by hospital management (LEADER); (3) the Hospital's agility as an organization (AGIL), and (4) the healthcare personnel's satisfaction with the job (EMPSATIS). To do so, confirmatory factorial analyses (CFA) were performed using the maximum likelihood estimation method. To test the hypotheses, structural equations modeling (SEM) were used as the maximum likelihood estimation method.

## **Results**

### *Analysis of the dimensionality and validity of the measurement scales*

The final HR measurement model is a second-order construct composed of four dimensions called "Training", "Participation", "Recognition" and "Communication", which are the standard dimensions included in the literature on HPWPs. However, to analyse the discriminant validity of this scale, a new model was estimated where the items were linked to one factor. The results of this new model [ $\chi^2(90) = 981.47$ ,  $p = 0.000$ , CFI = 0.68, NFI = 0.66, TLI = 0.57, RMSEA = 0.20] show the suitability of the second-order model [ $\chi^2(86) = 229.21$ ,  $p = 0.000$ , CFI = 0.95, NFI = 0.92, TLI = 0.93, RMSEA = 0.08] because it presents higher significance

levels and fit indexes, confirming that the scale is not one-dimensional. In fact, the chi-squared analysis reveals significant differences (Dif.  $\chi^2 = 752.26$ , Dif.  $df = 4$ ,  $p = 0.000$ ).

Even though this model is statistically significant [ $\chi^2(86) = 229.21$ ,  $p = 0.000$ ], it should be pointed out that the chi-squared statistic depends on the sample size. So it is necessary to analyse other fit indicators. In this regard, the results show that other global fit indexes of the model fall within the values recommended by the literature (CFI = 0.95, NFI = 0.92, TLI = 0.93, RMSEA = 0.08), leading to the conclusion that the specified model adequately reproduces the observed covariance matrix. This model shows a satisfactory fit because the CFI lies between 0.90 and 0.95, and the RMSEA value does not exceed the maximum recommended value of 0.08 (Mathieu and Taylor, 2006). Based on the study by Anderson and Gerbing (1988), as Table 2 shows, the model has acceptable individual reliability because the relationship between each item and its respective dimension is statistically significant, and most of the standardized regression weights are above 0.70. Concerning the internal

Causal relationships	Standardized estimators	<i>t</i>	<i>p</i>	Internal consistency
<i>HR PRACTICES</i> [ $\chi^2(86) = 229.21$ , $p = 0.000$ , $CFI = 0.95$ , $NFI = 0.92$ , $TLI = 0.93$ , $RMSEA = 0.08$ ]				
HR → Training	0.751			
HR → Participation	0.885	9.000	0.000	
HR → Recognition	0.776	6.533	0.000	
HR → Communication	0.730	8.586	0.000	
T1 → Training	0.823			FC = 0.908
T2 → Training	0.916	17.645	0.000	AVE = 0.713
T3 → Training	0.773	13.854	0.000	$\alpha = 0.908$
T4 → Training	0.859	16.610	0.000	
P1 → Participation	0.759			FC = 0.913
P2 → Participation	0.847	13.938	0.000	AVE = 0.678
P3 → Participation	0.883	14.629	0.000	$\alpha = 0.915$
P4 → Participation	0.776	12.584	0.000	
P5 → Participation	0.844	13.887	0.000	
R1 → Recognition	0.622			FC = 0.786
R2 → Recognition	0.964	8.458	0.000	AVE = 0.658 $\alpha = 0.749$
C1 → Communication	0.832			FC = 0.923
C2 → Communication	0.830	15.593	0.000	AVE = 0.751
C3 → Communication	0.891	17.342	0.000	$\alpha = 0.922$
C4 → Communication	0.910	17.968	0.000	
<i>Leadership</i> [ $\chi^2(8) = 2.22$ , $p = 0.136$ , $CFI = 0.99$ , $NFI = 0.99$ , $TLI = 0.99$ , $RMSEA = 0.07$ ]				
L1 → Leadership	0.917	21.912	0.000	FC = 0.940
L2 → Leadership	0.939	23.080	0.000	AVE = 0.838
L3 → Leadership	0.890			$\alpha = 0.936$
<i>Organizational agility</i> [ $\chi^2(12) = 6.53$ , $p = 0.038$ , $CFI = 0.99$ , $NFI = 0.99$ , $TLI = 0.98$ , $RMSEA = 0.09$ ]				
OA1 → Organizational agility	0.883			FC = 0.957
OA2 → Organizational agility	0.952	24.121	0.000	AVE = 0.848
OA3 → Organizational agility	0.957	24.384	0.000	$\alpha = 0.955$
OA4 → Organizational agility	0.890	20.476	0.000	
<i>Employee satisfaction</i> [ $\chi^2(12) = 4.80$ , $p = 0.091$ , $CFI = 0.99$ , $NFI = 0.98$ , $TLI = 0.95$ , $RMSEA = 0.07$ ]				
PS1 → Employee satisfaction	0.524			FC = 0.805
PS2 → Employee satisfaction	0.733	7.366	0.000	AVE = 0.514
PS3 → Employee satisfaction	0.763	7.493	0.000	$\alpha = 0.779$
PS4 → Employee satisfaction	0.814	7.626	0.000	

**Table 2.**  
Results of the  
confirmatory factorial  
analyses of the  
measurement models

consistency measures of each dimension and the global construct, the composite reliability (CR) indicator reaches values above 0.70, and the average variance extracted (AVE) values are above 0.50. The Cronbach's alpha values corroborate those obtained with CR. These results indicate, therefore, that the model is reliable.

The final measurement models for LEADER, AGIL and EMPSATIS are one-dimensional and composed of 3, 4 and 4 items, respectively. The results of the three models indicate that they are not statistically significant ( $p = 0.136$ ,  $p = 0.038$  and  $p = 0.091$ , respectively) and that the other global fit indicators present entirely satisfactory values (see Table 2). Therefore, it can be concluded that the specified models adequately reproduce the observed covariance matrix. Moreover, the individual reliabilities, the composite reliabilities, the variances extracted and Cronbach's alphas are satisfactory (see Table 2).

Appendix 1 shows all of the constructs and final items for each of the scales.

*Hypothesis testing*

In testing the hypotheses, the sample size restrictions recommended treating the dimensions of the HR construct as observed variables. So, four new variables were created based on the results of the CFA. These variables correspond to the weighted means of the items that make up each dimension, weighted by the regression weights for each of them in the CFA.

The results of the SEM model, included in Figure 2, indicate that the model is excellent [ $\chi^2(50) = 211.56$ ,  $p = 0.000$ ; CFI = 0.96; NFI = 0.93; TLI = 0.94; RMSEA = 0.08] because the CFI value is above 0.95, and RMSEA does not exceed 0.08 (Mathieu and Taylor, 2006).

These results allow us to draw the following conclusions:

- (1) Hospital management's leadership positively and significantly influences the application of HPWPs ( $\beta = 0.878$ ,  $p = 0.000$ ), explaining 77.1% of the variability in the application of these practices in the ICU. Therefore, hypothesis H1 can be supported.
- (2) Both hospital leadership and the application of HPWPs bring agility to the organization ( $\beta = 0.537$ ,  $p = 0.000$  and  $\beta = 0.347$ ,  $p = 0.003$ , respectively), explaining 73.6% of its variability. Therefore, hypotheses H3 and H4 can be supported.
- (3) Finally, the application of both HPWPs and organizational agility positively and significantly influences the healthcare personnel's satisfaction with their work

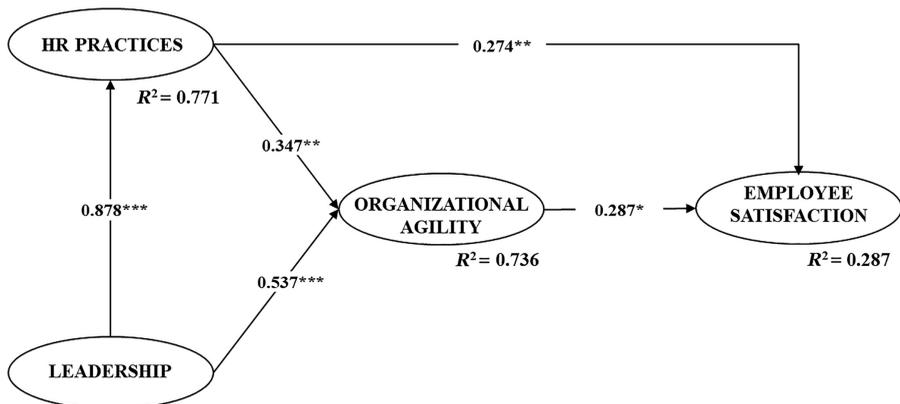


Figure 2. Results of the SEM model

Note(s): \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

( $\beta = 0.274, p = 0.050$  and  $\beta = 0.287, p = 0.033$ , respectively), explaining 28.7% of the variability. Therefore, hypotheses H2 and H5 are supported.

Once the influence of HPWPs in organizational agility and employee satisfaction has been confirmed, the multidimensional nature of these practices recommends hierarchizing them according to their level of impact in each of these two constructs. In order to do so, the degree of correlation between each of its dimensions with both constructs was determined through Pearson's correlation coefficient ( $r$ ) (see Table 3). The results indicate that all the practices have a positive relationship with both constructs. However, these results reveal that, related to organizational agility, communication has the highest correlation ( $r = 0.682$ ), followed by the other three dimensions with similar levels, ranging from 0.545–0.577. In this regard, the data reveal the importance of knowing and sharing the strategic direction, objectives and values of both the hospital and its specific work area for ICUs personnel at all times. On one hand, in ICUs, it is important to be continuously informed about organizational priorities, especially when working in contexts of uncertainty in patient care (Smith *et al.*, 2015; Marshall *et al.*, 2017). On the other hand, related to employee satisfaction, the participation and training dimensions have the highest correlation ( $r = 0.442$  and  $r = 0.415$ , respectively), compared to the communication and recognition dimensions ( $r = 0.371$  and  $r = 0.264$ , respectively). Therefore, findings support the importance of having highly qualified healthcare personnel in ICUs, as stated by Valentin and Ferdinande (2011), and the need for teamwork and joint decision-making, as explained by Marshall *et al.* (2017).

## Discussion

The results of this research provide interesting theoretical and practical implications for the healthcare sector and specifically for ICUs.

### *Theoretical implications*

This study is aimed mainly at shedding light on a research topic of increasing, established interest for academics such as agility-oriented organizational management in the face of uncertain situations (Teece *et al.*, 2016; Tallon *et al.*, 2019). Specifically, the authors address this issue by analysing the factors that improve agility in the healthcare sector (Pipe *et al.*, 2012; Patri and Suresh, 2017), focussing on a scarcely researched context: ICUs. In this sense, another significant contribution is the fact that this study has focused on analysing ICUs from a managerial perspective and not only from a clinical point of view. Thus, this paper highlights how necessary it is to study these highly complex units based on a service management approach, as pointed out by Ervin *et al.* (2018). Therefore, this study makes an academic contribution aimed at providing organisational answers to ICU management, to bridge the existing gap in the literature on managing these sorts of units. This approach is especially relevant because the study took place in the public sector. Therefore, it was necessary to justify organisational efficacy in the provision of services from a social point of view (Bowser *et al.*, 2019).

Dimensions of human resources practices	Organizational agility		Employee satisfaction	
	$r$	$p$	$r$	$p$
Training	0.577	0.000	0.415	0.000
Participation	0.561	0.000	0.442	0.000
Recognition	0.545	0.000	0.264	0.000
Communication	0.682	0.000	0.371	0.000

**Note(s):** \*\*\* $p < 0.001$

**Table 3.**  
Correlations of human  
resources practices  
with organizational  
agility and employee  
satisfaction

The importance of delving into the relationship between the human dimension and organisational agility is based on the highly interdependent and dynamic nature of the working environment in ICUs (Masaroli *et al.*, 2015). The high interdependence of ICUs with other units may generate poor interdepartmental coordination, problems with hospital functioning and, therefore, poor resilience to changing conditions (e.g. problems between ICUs and emergency areas) (Clay-Williams *et al.*, 2019). Additionally, ICUs are critical organizational units within the hospital system. Therefore, if care quality in ICU is deficient, it affects other departments and, consequently, the hospital in general (Oerlemans *et al.*, 2018). Therefore, ICUs should respond quickly, diligently and efficiently using organisational resources provided by hospital management.

In addition, studying the influence of HRM on organisational agility is vital, as recognised by Ahammad *et al.* (2020). Therefore, this study contributes to the literature on management by making a theoretical proposal and validating a research model. Moreover, this model associates constructs that had been either scarcely analysed or not studied at all previously in healthcare literature, and more specifically, in the context of ICUs, as suggested in this research. The results of this study empirically confirm the role of the human dimension (leadership and HPWPs) in organizational agility of hospital management in complex, uncertain environments, which is of particular importance in ICUs. Hence, efficiently managing employees in a highly dynamic working context improves hospitals' capacity to meet patients' needs. Thus, the results of this study support Liang *et al.* (2018)'s premise on the relevant role of the human dimension in organizational agility in the public sector.

Additionally, the results show that in hospital units, hospital leaders play an essential role in the design of HRP in ICUs, confirming the findings of similar studies in other contexts (Tari *et al.*, 2007). Second, there is also a positive and direct impact of HPWPs on the satisfaction of ICU personnel. This hypothesis, confirmed specifically in ICUs, supports the results from previous studies in hospitals (Ang *et al.*, 2013) and healthcare service (Vermeeren *et al.*, 2014). Like this, we increased the limited number of works focused on the effects of HPWPs on healthcare personnel satisfaction in ICUs. Third, the relationship between leadership and organizational agility has been shown. In this regard, leader actions suggested in this paper are in line with the formulae proposed by the EFQM model (EFQM, 2012) to enhance organizational agility. In this sense, the study provides guidance for hospital managers to optimize ICU administration. Fourth, results also recognize the effect of HPWPs in organizational agility (Nijssen and Paauwe, 2012). In other words, HRP such as training, participation, recognition and communication positively contribute to improving hospital agility. Finally, it is important to highlight the impact of organizational agility on healthcare personnel satisfaction in ICUs. The effect of this vital relationship, rarely addressed in academic contexts, helps explain that workers feel more satisfied with their work when they perceive that the hospital is agile and responds quickly and flexibly to dynamic contexts, which also improves their work experience. These results support the premises of social exchange theory on health care (Almaaitah *et al.*, 2017) in the context of ICUs. Thus, these employees will show a positive attitude towards the hospital when they consider that their organization is beneficial to them.

#### *Managerial implications*

Regarding the practical implications of the results obtained, hospital leaders should show intense concern and a positive attitude towards quality, ongoing improvement and innovation. This research shows the need for enthusiastic, effective and proactive leaders who are committed to quality, continuous improvement and innovation. In addition, hospital managers should engage personnel in the establishment of hospital objectives and plans. To that end, multi-disciplinary, multi-level teams can be created during the strategic planning

process, to guarantee the success of organizational mission and ensure that the specific needs of each hospital unit are met. This holistic approach to organizational integration is essential for the proper performance of hospital services and specifically for ICUs, supporting the idea suggested by [Kyeremanteng and D'Egidio \(2015\)](#). On the other hand, hospital management must adopt a culture of innovation, fostering a proactive management attitude and a greater capacity to predict and adapt to future changes in environment. Along this line, the hospital's proactive strategic analysis must include practices such as scenario planning, recently recommended in the literature on management in other areas ([Vecchiato, 2015](#); [Slagmulder and Devoldere, 2018](#)). This will allow hospital management to identify challenges and opportunities in the environment.

In addition, it is essential that the development of HPWPs is coherent with the organizational philosophy that management defends. Specifically, hospital leaders must orient training, participation, recognition and communication towards organizational excellence. As managerial implications, this paper recommends, among others, the development of quality circles or employee suggestion programs as initiatives involving the staff in the process to improve the hospital system, as suggested by [Chung and Yu \(2012\)](#). Thus, for instance, hospital management must encourage ICU staff to become involved in defining quality standards for their units. In addition, the medical chief of staff can and must propose specific training courses for the members of their team. In this regard, training ICU staff would help reduce the variability of processes and, consequently, mistakes committed during patient care, as indicated by [Hackner \(2010b\)](#). Thus, staff members who receive training to deal with critical situations and are involved in decision-making will contribute to effective hospital management in changing and uncertain contexts. Therefore, enhancing HRP, which train, empower and motivate ICU personnel, contributes to improving unit performance and hospital systems.

It should be noted that the practices analysed influence organizational agility, but communication, acceptance and understanding of organizational objectives and values are fundamental to the daily work of ICU personnel. This highlights again the need to involve ICU staff in the hospital's strategic planning process, as we suggested before. In turn, implementing HRP and greater organizational agility will lead to making healthcare professionals more satisfied with the work they do. Specifically, although all HRP influence the satisfaction of ICU personnel, the ones with the most positive correlations are training and participation. For this reason, hospital management is advised once more to promote the development of the technical and social skills and competencies required by healthcare personnel and foster teamwork and multidisciplinary collaboration in the ICU work system.

### Conclusions and limitations

The present study shows that the human dimension in hospitals and specifically in ICU, contributes to organizational agility. Thus, the leader's effort to have a proactive and participative organization, fostering quality, ongoing improvement and innovation in processes and services is decisive in increasing the hospital's capacity when facing contexts of change. In addition, from the perspective of ICU personnel, HPWPs positively influenced by the leader's role also favour organizational agility. Likewise, organizational agility influences the attitudes of ICU personnel – doctors and nursing – exerting a positive impact on employee satisfaction. These results contribute to addressing the argument by [Ramanujan and Rousseau \(2006\)](#) that the new challenges in hospital management are organizational rather than just clinical.

On the other hand, the main limitation is that the data were collected from three ICUs in one public hospital. Although it would be necessary to replicate this study in other organizational and geographical contexts in order to consolidate the observations made, conclusions

obtained can be extrapolated to organizations that provide similar services, that is, services where highly qualified professionals work together in situations of uncertainty and demand a dynamic attitude from their organization to facilitate their daily work. Finally, this study shares many points in common with a recent line of research on the role of the human factor in ambidextrous organizations (Hansen *et al.*, 2019; Swart *et al.*, 2019). Ambidextrous organizations are organizations that make good use of their existing resources and capabilities but can also innovate and respond to changing environments. In this regard, hospitals have typically been professional bureaucracies (Mintzberg, 2009). However, nowadays, they must combine a bureaucratic structure with a base composed of professionals who must be ready to give organic responses. Thus, for instance, as pointed out by Pina e Cunha *et al.* (2020), HRP's help organizations improvise and therefore promote ambidextrous organizations in changing environments. These practices might be relevant in the healthcare sector, as well as in dynamic, uncertain services such as emergency care and ICUs.

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## Appendix 1

Construct/Dimensions		Items		
HR PRACTICES	<i>Training</i>	T1	The training plan contemplates training activities that prepare the healthcare personnel to deal with critical situations (psychological training, managing stressful situations, conflict resolution, etc.)	
		T2	The training plan contemplates activities that prepare the healthcare personnel in the care and management of relationships with the patient	
		T3	The training contemplates activities that improve the technical skills of the healthcare personnel for optimal performance of their job	
		T4	The training plan contemplates training activities in quality management (knowledge of ISO norms, functioning of quality improvement tools, etc.)	
	<i>Participation</i>	P1	Teamwork, collaboration, and a group feeling are fomented	
		P2	Meetings and conferences are organized to debate and exchange experiences and proposals to resolve problems and improve the ICU service	
		P3	Healthcare personnel are encouraged to participate in the design and improvement of the procedures and processes that affect the correct performance of their jobs	
		P4	Healthcare personnel are encouraged to make proposals and suggestions about improvements in the ICU (suggestion box, directly to supervisors, etc.)	
		P5	Healthcare personnel are encouraged to participate in activities and projects that improve the ICU	
	<i>Recognition</i>	R1	The economic reward/salary corresponds to the effort and work done by the healthcare personnel	
		R2	The recognition of individual work by people with management responsibilities in the ICU encourages greater effort and involvement	
		<i>Communication</i>	C1	The management team of the Hospital has made an effort to communicate its mission, vision, and values
			C2	I have a lot of knowledge about the mission, vision, and values of the Hospital
	C3		The management team of the Hospital communicates its plans and objectives	
	LEADERSHIP	C4	I know what the plans and objectives of the Hospital are.	
		L1	The management team of the Hospital is involved in and committed to the quality of the service	
L2		The management team of the Hospital foments continuous improvement and innovation		
ORGANIZATIONAL AGILITY	L3	The management team of the Hospital foments the participation of the members of the organization in designing its plans and setting its objectives		
	OA1	The Hospital is an agile organization capable of adapting to changes		
	OA2	The Hospital has the capacity to predict and identify changes		
	OA3	The Hospital has the capacity to respond quickly to changes		
EMPLOYEE SATISFACTION	OA4	The Hospital has the capacity to respond flexibly to new demands for services that arise, adapting them to the resources and means available		
	PS1	I am satisfied with my work		
	PS2	I feel like the people with management responsibilities are satisfied with my work		
	PS3	I feel like my co-workers are satisfied with my work		
		PS4	I feel like the families/patients are satisfied with my work	