Nursing Practices and Learning in a Complex System

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Abstract

Hospital nursing plays a very important role in the promotion of healthcare through its professional practices. The main purpose of this work is to examine practices and routines of the nursing sector that promoted learning, materialized in elements of a complex adaptive system. The qualitative research was constituted in a case study with a cross analysis. The study was conducted in the nursing sector of a large community cancer hospital in Brazil. The data were collected through interviews, non-participant observation and document analysis. An analysis revealed that the main practices that aided learning in the nursing sector included informal and individual interaction among professionals and ongoing education, with training and external events. They also included informal action among professionals, with discussion groups, regular meetings and the relationship between professionals and patients. The results showed the existence of a "learning culture" as one of the principal strategic factors constructed through effective learning practices that helped to improve the provision of nursing services.

Keywords: Complex System. Practices. Learning. Hospital. Nursing

1. Introduction

The understanding introduced by complexity theory that uncertainty and unpredictability are present in organizational environments opposes the traditional view that organizations are machines with linear behavior (McDaniel and Drieber, 2005). Unpredictability and uncertainty result from interactions with an ever-changing external context and the dynamic of an internal context, both founded on the sensemaking of professionals in hospital organizations (McDaniel, 2007; Jordon e*t al.,* 2010; Pascucci and Meyer, 2011 and Meyer, Pascuci and Mamédio, 2016).

Learning, as a social act, results in complex systems with non-linear relationships (McDaniel, 2007). It is an interactive process of design, development, reflection and modification of actions. Therefore, the focus of learning in organizations is concentrated in the actions of individuals and their daily practices (Edmondson, 1999; Antonacopoulou, 2006; 2007; 2008).

One of the characteristics of professional practices in hospitals, particularly in the nursing sector, is represented by systematized routines and procedures and a diversity of specialties (Antonacopoulou and Chiva, 2007). These practices manifest through actions and in the form of languages, symbols and tools, activity systems, social context and knowledge (Antonacopoulou, 2008). They materialize in individual, group and organizational learning.

The aim of this study is to examine the practices in the nursing sector that promoted changes and learning with a view to improving processes and routines in a complex system, based on elements of sensemaking and improvisation. The study is qualitative in nature in terms of method and characterized as a case study (Stake, 1994, p. 99). The focus of the study was a large, non-profit community hospital.

The theoretical basis of the study was founded on the concept of the hospital as a complex organization (Etzioni, 1964; Perrow, 1986; Mintzberg, 1994; McDaniel, 2007; Jordon e*t al.,* 2010; Pascucci and Meyer, 2011; Meyer, Pascuci and Mamédio, 2016), sensemaking (Weick, 1995; McDaniel and Drieber, 2005), improvisation (Moorman and Miner, 1998a; Miner *et al.*, 2001; Cunha and Kamoche, 2002; Cunha *et al.*, 2006) practices and routines (Edmondson, 1999; Antonacopoulou and Chiva, 2007) and learning (Stacey, 1995; Axelrod and Cohen, 1999; Perrow, 1999).

This study makes three main contributions to the field. The first is that it examines how improvisation was revealed in professional practice, particularly in the routines of the hospital nursing sector. The second is that it analyzes the influence of elements of the complex adaptive system, such as adaptation, self-organization and non-linearity in the practices of the nursing sector. The third is linked to the importance of sensemaking through informal relationships between professional agents, discussion groups and interaction with patients to improve nursing routines. The results showed that the practices that aid learning in the nursing sector are routines, improvisation, simulations, training and conversation.

2. Previous Research
2.1 Hospitals as Complex Organizations

Hospitals are recognized in the literature as complex organizations (Perrow, 1986; Thomas, McDaniel and Anderson, 1991; Mintzberg, 1994; McDaniel and Drieber, 2005; Meyer, 2007; McDaniel, 2007; Pascucci and Meyer, 2011; Tucker and Edmondson, 2003; Jordon *et al.,* 2010; Meyer, Pascuci and Mamédio, 2016).

Hospital organizations need to consider the aspects of the complexity of this kind of organization, at the risk of suppressing the analytical richness in the interactions of agents (Jordan *et al.* 2010). Some elements are considered fundamental to the management of this kind of organization (McDaniel, 2007), such as sensemaking (Weick, 1995), organizational improvisation (Moorman and Miner, 1998a; Miner *et al.*, 2001; Cunha and Kamoche, 2002; McDaniel and Drieber, 2005; Cunha *et al.*, 2006) and practice and routine (Antonacopoulou and Chiva, 2007), with a strong influence on the learning process.

In the face of the limitations of planning in projecting the future and the uncertainties in the life of organizations, improvisation emerges to help individuals handle surprises and the unexpected (Crossan and Sorrenti, 1997; Jarzabkowski and Kaplan, 2014). In organizations, improvisation is the spontaneous convergence of design and execution while something new is produced (Moorman and Miner, 1998). Situations of uncertainty and unpredictability permeate organizations and affect how they promote learning.

In this respect, improvisation is seen as a way of exploring and experimenting possibilities without knowing the path that will be trodden or how it will unfold (Barret, 1998). Improvisation is a tool that allows organizations to generate responses to manage change in a complex system, contrary to the idea of traditional rational management that remains attractive to many managers. As it is impossible to predict the future, the challenge of a complex system lies in knowing how to handle unpredictability. Surprise in a complex organization is not the result of a lack of prior information, but part of the very nature of the organization in question (McDaniel and Drieber, 2005).

2.2 Practices and Routines

One of the main features of organizational systems is their routines and organizational practice. Most of the time, practices manifest or materialize through routines and systematized procedures, characterized as diversity and schemas (Antonacopoulou and Chiva, 2007). The concept of practice can be represented as action, structures, languages, symbols and tools, activity systems, social context and knowledge (Antonacopoulou, 2008).

Routines may be defined as behavior patterns guided by rules or a repertoire of possible behaviors (Antonacopoulou and Chiva, 2007), subject to change when the context varies (Winter *apud* Milagres, 2011, pg. 164). These patterns carry stored behavioral capacities or capabilities, knowledge and memories, organizational structures and individual habits (Becker, Salvatore and Zirpoli, 2005). However, in complex organizations, a set of routines permeate organizational activities, from which improvisation may emerge. These are the social structures, agents and artifacts that create the conditions that determine their interaction (Feldman, 2000; Pentland and Feldman, 2005).

Habits and routines are part of a dominant cognitive structure formed by the history, social traditions and experience that influence individual behavior (Lazaric, 2000; Veblen, 2006). Treated as synonyms, habits and routines materialize in automatically activated behavior patterns (Veblen, 2006). Habits can surpass individual limits and reach the collective level, for example, by excluding a certain group of those who do not have the same knowledge and behavior.

2.3 Nursing Sector as a Complex Adaptive System

Complex adaptive systems (CAS) are characterized by their capacity to achieve regularity, through non-linear relationships, established by diverse schema that, in the light of experience, are constantly modified, shaping their adaptive capability (Stacey, 1996). These systems have a set of properties that make them unique. Chaffee and McNeill (2007) identified 11 properties, which are shown in Table 1, below.

Table 1: Properties of a Complex Adaptive System

Property	Description of Property
Adaptive elements	Elements in a CAS can evolve
Attractors	Catalysts that enable a CAS to promote the emergence of new behaviors.
Co-evolution	Co-evolution occurs in a CAS with constant tension and balance.
Context and Embeddedness	A CAS resides within and interacts with other systems that influence it.
Emergent behavior	New behavior is a feature of the CAS, represented by constant innovation and creativity.
Inherent order	Order is maintained in a CAS even without central control.
Non-linearity	Implies that in response to a stimulus a variety of behaviors are possible, and the cause and effect relationship is not directly evident or linear.
Porous boundaries	The boundaries of the elements in a CAS are blurry and porous, allowing exchange and movement between them.
Self-organization	Process where many interactions create order without direction from above.
Simple rules	Local application of simple rules in a CAS can result in broad complex outcomes.
Unpredictability	Forecasting is inexact in a CAS because elements change, behavior emerges and activities and relationships are nonlinear. Therefore, the trajectory of a system is unknowable in advance.

Source: Adapted from Chaffee and McNeill (2007).

2.4 Learning in a Complex System

Learning is a social act and greatly dependent on nonlinear relationships (McDaniel, 2007). It is an interactive process of design, development, reflection and modification of actions. Therefore, the focus of learning in organizations is concentrated in the actions of individuals and their daily practices (Edmondson, 1999). An organization depends on its individuals to learn. However, individuals do not necessarily need the organization in order to learn (Kim, 1998). In this context, individual learning is the origin of organizational learning, with the individual being the center of this process.

Learning is the result of interaction between the individual and the environment throughout their existence (Kolb, 1984). Social interaction is a fundamental element for defining group learning as a level of learning between the individual and the organizational. Therefore, knowledge is linked to the practices of individuals in the organizational environment (Argyris and Schön, 1978). Organizational learning only occurs by recognizing certain practices that orient the whole organization (Antonacopoulou and Chiva, 2007).

In hospital organizations, rich learning opportunities stem from problems and errors in their activities (Tucker and Edmondson, 2003). The focus of learning in hospitals, and particularly in the nursing sector, is still largely based on individual learning (Borba and Kliemann Neto, 2008). The dissemination of individual learning to create an organizational meaning for learning, proposed by Edmondson and Bohmer (2001), means understanding the daily practices of these professionals, constituting the process of reflection, reinterpretation, refinement and codification, encouraged to occur in groups rather than only individually.

3. Research Method

This study is characterized as a case study of a qualitative nature (Stake, 1994). It is intrinsic and involves a cross analysis. The aim was to examine nursing practices in a complex system with the potential to promote organizational learning at a community hospital. The cross analysis is justified by the need to analyze the history of the practical actions of learning.

Semi-structured interviews were used to collect perceptions (sensemaking and improvisation) and professional practices (routines and procedures). Technical data from the sector were used to understand the practices of individuals, constituting the analysis level (Stake, 2000).

Eighteen nurses were interviewed. They were considered key respondents for the purpose of this study. They were selected by non-probabilistic sampling, classified by Sampieri (2006) as the individual type, bearing in mind the interest in professionals directly involved in hospital nursing. The choice of the professional respondents was based on the following criteria: 1) importance of professional activities to this study; 2) experience measured by the length of time the professionals have worked in the nursing sector; and 3) availability for interview.

The sample was composed as follows: 5.5% male nurses and 94.5% female, with an average age of 29 years. Regarding professional experience, 50% of the interviewees had previous experience in the field of nursing at the hospital in question. In terms of academic qualifications, all of them had a degree in nursing, and 50% had at least one specialization in the field.

The focus of the study was a hospital specializing in oncology, which plays a fundamental role in providing healthcare services to the community. It is located in the south of Brazil and has an installed area of 10,000 m², with 130 beds for hospitalized patients, 10 beds in the ICU and five operating theaters with the latest equipment for the treatment of cancer. Forty-one specialties and services are offered to the community. Founded in 1991, the hospital treats an average of 9,000 patients a month. The nursing sector is made up of 33 nurses and 264 nursing technicians. These professionals take turns on three daily shifts.

4. Analysis

The main practices observed in the nursing sector were characterized by the heavy commitment to the learning process. With the practices adopted by the nursing professionals, we identified characteristics of a complex adaptive system (Chaffee and McNeill, 2007). The learning processes identified below are evidence of individual, group and organizational learning as interactions between agents occurred.

We highlight the existence of interdependence between the agents and their practices. Regarding the professional practices being developed, we found that the nurses showed different ways of obtaining knowledge in addition to their academic achievements. Learning from this source was related to professional autonomy in seeking individual improvement in professional practices.

The learning processes in the organization depended on the personal initiative of each professional. The individual level was the first level of knowledge that we identified. In this respect, one of the interviewees stated that, "S*tudying more at home, reading scientific articles related to the subject made me raise some doubts [...] as here the only resource is the internet. When we have a doubt here, we resort to the internet and clear it up right away* (excerpt from Interview 11).

Individual search for knowledge is always a solitary affair. In this process, the individual does not need the organization in order to learn, unlike the organization, which depends on individual learning (Kim, 1998). We observed that the search for knowledge outside the workplace was more evident among professionals with less experience in the field of nursing, in general, those who had been working for under a year. One interviewee claimed, *"I would go home and study, and this was never hard for me. Until today, mainly when I'm in the ICU, something happens [...] and I check it out at home. I still do this today and the main source is my books, as I still have a lot of doubts"* (excerpt from Interview 08).

The transition from individual learning to the group and organizational level is a complex process that depends on the interaction of the agents. The existence of organizational learning was represented in the hospital in question through the organizational memories, routines and rules, while individual learning was in the cognitive structure of each individual and materialized in their daily practices. Thus, individual and group learning proved to be the basis for organizational learning in the case in question.

Therefore, individual learning is not a process that only occurs when professionals consult books or conduct online searches. It also occurs through social exchanges in conversation (Kolb, 1984). One nurse stated, *"When we don't know something, we also ask the doctors"* (excerpt from Interview 18). Informal interaction was fundamental to the building of the nurses' individual knowledge, as shown in one of the interviewees' comments. *"So, when I was in doubt, I would talk to the nurses that had been there longer than me"* (excerpt from Interview 01).

We noted that the sharing of information helped the professionals to exchange experiences. Through interaction, individuals begin to share their knowledge and the experiences they have acquired in their professional activities. In this respect, one nurse stated, *"Whenever we have a doubt, the group of nurses gets together, and this is helpful to us, having orientation from the staff that have been at the hospital for longer and have more experience" (*excerpt from Interview 07).

An important aspect was the identification of microstructures in the nursing sector as a way of manifesting their practices and exchanging experiences and good practices. We found that in each sector the nurses worked more closely in their daily lives and communicated more frequently, using interaction as an alternative form of learning. In this respect, one interviewee said, *"When there is a problem, we don't put it off until tomorrow. The team gets together in a corner somewhere and works it out there and then. We don't leave it for later*" (excerpt from Interview 02).

Through interaction, as an informal process, with the individual initiative of the professionals in the nursing sector, we found that individual learning was not related to formal training programs arranged by the organization. This behavior is a characteristic of complex systems, where these relationships, defined as informal structures, are accepted by the agents and aid individual, group and organizational learning (Stacey, 1996). Sometimes, exchanging experiences is the only source of

information in emergencies (researcher's observation). We found evidence of this in a statement by a night nurse, who said, *"If we need help or anything else, we talk to our colleagues, right here at the hospital"* (excerpt from Interview 07).

We also noted that organizational learning was present in the organization, mainly based in the organization's interactive networks, both formal and informal, which is a characteristic of complex organizations (Stacey, 1996). We identified informal processes as rich processes in the creation of learning, although they were not formally documented in the hospital structure. These processes are recognized as legitimate by the members of the group and, in general, are used intensely in the organization. These processes include interaction between professional agents, discussion groups and interaction with patients, as shown in Table 2.

Table 2: Learning processes

Formal processes	Informal processes
Ongoing education **Attending external events** **Formal meetings** **Routines**	Interaction between professional agents Discussion groups Interaction with patients

Source: Interviews (2015).

We observed that these learning processes occurred spontaneously as an initiative by the professionals through informal networks or a shadow system (Stacey, 1996). The formal processes that we examined showed the ongoing education of the nursing professionals, attending external events for training, formal meetings and routines.

At the hospital, we observed a nurse in charge of ongoing education, who manages and encourages the legitimate network processes in order to generate organizational learning. The importance of this practice was emphasized by one of the nursing professionals. *"We have an ongoing education sector [...] many professionals, no matter how long they have been at the hospital, need retraining, and in our profession you tend to get really addicted to techniques [...] and the purpose of the ongoing education is to remind us all the time that we need to follow the right technique"* (excerpt from Interview 05).

We observed the practice of organizational incentives for professionals in the nursing sector to attend external events as a formal process in the hospital. Evidence that the organization provides the resources required for this incentive was given by one of the interviewees. *"Whenever we want to go to a conference, or maybe a course [...] they always help out with travel expenses to conferences and we often send a paper to these conferences, and sometimes they help by paying for online courses"* (excerpt from Interview 09).

Attending formally organized events created a new informal network of relationships between the nursing professionals and external professionals. The result of these relationships was the promotion of knowledge of new routines, new practices and new interactions that brought new learning into the internal environment. In this respect, a nurse made the following comment. *"You also have to seek knowledge at conferences and in the literature. Every day, you come up against a different disease. Every day, more treatments are available, and there are several kinds of protocols that you have to become really familiar with"* (excerpt from Interview 02). By bringing knowledge acquired externally to internal discussions, the professionals helped to expand group and organizational learning by sharing information, accumulating experiences and reflecting on their practices.

This interaction between the professionals had a strong influence on individual, group and organizational learning, which materialized in the classical characteristics of the complex systems, corroborating the definition of hospitals and the nursing sector as a complex adaptive system (Mintzberg, 1994; Tucker and Edmondson, 2003; Chaffee and McNeill, 2007; Meyer, 2007; Pascucci

and Meyer, 2011). Therefore, there is a very intense feedback network, be it formal or informal (Stacey, 1996).

When new nurses are hired, their integration is monitored by one of the more experienced nurses, who acts as a tutor to facilitate the learning process of the new arrival. One nurse made the following statement. *"I learned from my older colleagues. This happens because they stick to you until you get the hang of things"* (Interview 13). This process highlights alignment with the hospital's internal policy, showing competent professional practice in an attempt to provide reliable healthcare services (researcher's observation).

In this context, the more experienced nursing professionals provide security for the new ones by sharing information and supporting their activities. One of the nurses stated, *"Quite often, we end up learning the routine from our more experienced colleagues"* (excerpt from Interview 01). Another nurse claimed, *"Lots of things here are different and we learn a lot in practice from our other colleagues"* (excerpt from Interview 03).

We also observed that the nursing sector has discussion groups, known as committees. The committees function with multidisciplinary teams to discuss subjects related to nursing to improve learning and the quality of services. In this respect, one of the interviewees stated, *"Yes, there are several committees. There's a quality committee, a patient safety committee, a committee for the control of secondary infections and a cutting and piercing committee"* (excerpt from Interview 03).

The interaction of these professionals helped create a "learning culture", as all the nurses contribute their own knowledge to the development of nursing and patient treatment. Diversity is an important element in the emergence of learning, within a process of reflection on the part of the agent and exchanges of diverse experiences, as shown in the following statement. *"Contact with the technical nurse, technical doctor, medical nurse, multi-professional team, physiotherapist, pharmacist, nutritionist, assistant doctor, the nurse who coordinates the ICU and the medical coordinator of the ICU. I think of this whole group when this contact is made, because there are many occasions in the ICU when this group all gets together and this leads to learning"* (excerpt from Interview 15).

The development of professional practices are known not to depend only on specific technical knowledge. The nurse-patient relationship also requires mutual trust. This learning occurs through the practical experiences of each professional. A hospital, as an organization for the promotion of human health, integrates this relationship practically and dynamically. In Table 3, we have compiled the learning practices in accordance with the properties and characteristics of Complex Adaptive Systems.

Table 3: Learning practices and CAS properties

Learning Practice	Learning Level	Type of Interaction	CAS Properties
Ongoing education	Individual	Formal	Co-evolution
Attending external events	Individual	Formal	Feedback network
Formal meetings	Individual Group	Formal	Simple rules
Routines	Individual	Formal	Simple rules
Interaction between professional agents	Individual Group	Informal	Porous boundaries; Unpredictability; Self-organization; Feedback network; Inherent order
Discussion groups	Individual Group	Informal	Unpredictability; Self-organization; Co-evolution; Feedback network
Interaction with patients	Individual	Informal	Context and Embeddedness; self-organization

Source: Research (2015).

The learning processes were greatly aided by the daily practices, represented by actions, structures, languages, symbols and tools, activity systems, social context and knowledge (Antonacopoulou, 2008).

5. Discussion

Due to their complex nature, hospital organizations introduce new horizons in organizational research, especially organizational learning, the fruit of social interactions strengthened by the diversity and heterogeneity of agents. The nursing sector needs reviews and continuous improvements to its routines and professional practice, requiring its agents to be constantly concerned with the continuous improvement of professional procedures.

Both the endogenous and exogenous connections created by the nursing professionals have helped to improve or aid understanding of the environment created for the learning context. The connections developed by the professionals are not restricted to their peers, but also include the external environment.

The formal learning processes are related to a standard procedure included in the standard structure established by the directors and accepted by the professionals. The outcomes of these practices were significant and understood by the professionals as fundamental for the professional development of the sector and the improvement of healthcare services. However, we noted that the practices considered informal were of considerable importance, especially the interaction between professional agents, discussion groups, routines and interaction with patients.

An important finding of this study that deserves to be highlighted is the informal interaction of the professionals in the nursing sector, which contributed significantly to the creation of a "learning culture" developed in the nurses' professional practices, as all the professionals contributed their knowledge to the development of nursing and patient care. The diversity of agents was highlighted as an important element in the emergence of learning in the reflection process of the agents and the exchange of diverse experiences.

Improvisation was also revealed as an important element in the nurses' professional practices, considered a rich experience that contributes to individual and group learning in complex adaptive systems and contexts of unpredictability. We observed that improvisation was present wherever a previously established routine did not provide solutions to a new problem and where intuition guided the situation spontaneously (Crossan and Sorrenti, 1997; Barret, 1998).

Uncertainty regarding the process of handling a cardiac arrest, for example, is a constant concern for the nursing team. This concern leads to the creation of a set of actions to simulate emergencies with patients. Failure in an emergency in a hospital generally means the loss of a patient's life. The statement made by one of the nurses showed the constant concern of these professionals with their patents' health. On the subject of experience with emergencies, she stated that she had never "lost" anyone, referring to the fact that in her case emergencies had always been handled successfully and that the death of a patient meant a loss to all the professionals.

Every treatment provided by the nursing professionals was considered unique. The professionals in the sector had to adapt to this context and the different realities they faced daily to ensure technical quality and patient safety. This meant that the professionals had to handle unexpected situations. The variety of possible reactions to the medical treatment precluded the nurses from having previous knowledge to deal with every situation, and they resorted to improvisation.

In situations of improvisation, the nurses with more experience at the institution had greater freedom to make decisions that did not always follow a pattern and apply the use of bricolage, in which the set plan is neutralized to make way for the use of the resources on hand to solve unexpected problems (Flach and Antonelo, 2011).

Emergencies are always characterized by unpredictability. Thus, the more prepared professionals are, the greater their chances are of success in an unknown or unexpected situation. Therefore, simulations were important actions in the learning process. They were usually prepared by the sector coordinators and the nurses in charge. The simulations were similar to those used in training, but with a sharper bias of practice. In addition to strengthening theoretical and practical knowledge, they were a true test of the professionals' behavior in emergencies.

Simulations are used by professionals to improve their knowledge by training common practices in emergencies. The repetition and memorizing of situations experienced by professionals are helpful when dealing with surprises (Flach and Antonelo, 2011).

In organizations that provide services, such as hospitals, one of the challenges to face is managing elements that are difficult to measure and monitor, such as interactions between nursing professionals and patients, meaning that any attempts at monitoring are harmless.

6. Concluding Remarks

Practices are an important element in professional organizations such as hospitals and are represented by routines, improvisations, surprises, the unexpected and discontinuity. The promotion of quality and reliable services largely depends on the integration of a range of professionals, their cognitive, social, rational, political and psychological aspects overlapping and intertwining. Given the nature of human relationships, inherent to nursing, factors such as knowledge, experience and skill become fundamental to professional practice.

For nursing professionals, individual and group learning were an intrinsic process of their activities to achieve ongoing improvement in their work. As a living and dynamic organism, the agents of the nursing sector permanently interact through organizational practices and routines and formal and informal relationships that generate learning. The informal interaction of professionals in the nursing sector was a strong factor that contributed significantly to the creation of a "learning culture". This process emerged as each professional contributed his or her knowledge to the development of nursing and patient care.

The transition from the individual to the group and organizational level was characterized as a complex process deriving from the intense interaction of agents. Organizational learning materialized through organizational memories, routines and rules, while individual learning derived from the cognition of each individual and materialized in their daily practices. Organizational learning occurred from the moment that new knowledge and practices began to benefit the entire nursing sector and other medical sectors, as well as the provision of healthcare services.

The professional interaction identified in this organization, as seen through the nursing sector with medical professionals and the administrative sector, corroborates the understanding of Etzioni (1964), Mintzberg (1994), Tucker and Edmondson (2003), Meyer (2007), Chaffee and McNeill (2007), Pascucci and Meyer (2011) that the nursing sector in hospitals is considered a Complex Adaptive System.

The learning in the nursing sector was aided by continuing education, with training and external events, informal interaction between professional agents, discussion groups and regular meetings, and the professionals' relationship with patients and routines. These practices broadly sustain the learning processes, especially individual learning. This feature is corroborated in Vassalou's (2001) study, claiming that organizations tend to support practices that focus on reducing errors and creating new individual skills.

This research also has important implications for practice and hospital routines. We agree with Moorman and Miner (1998a: 16) when they suggested that "in some contexts, improvisation may not be only what organizations actually practice but also what they should practice to flourish". Our suggestion for future studies concentrates on examining improvisation as a way to create new routines and other procedures in the nursing sector. We also propose assessing the concept of minimal structures (Kamoche and Cunha, 2001) in improvisation practices, with implications for learning. Likewise, we propose evaluating how learning occurs as new routines emerge in the improvisation process and are integrated into organizational practice.

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