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Original Article

Quality indicators for the processing of health products: A mixed-methods study*

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Highlights: (1) Appreciative planning is a resource for leveraging changes and improvements in service. **(2)** The mixed-methods approach presents a more complete analysis of the problem. **(3)** Understanding the team's view of the processes is the first step towards good practices.

Objective: to analyze the use of quality assessment indicators and their implementation to improve quality in the processing of health products. **Method**: a mixed-methods study with a multiple case approach using Structure, Process and Results indicators and elaboration of a plan using Appreciative Inquiry, carried out in four central sterile supply departments from hospital units. **Results:** the indicators for the Cleaning stage presented 47.8% compliance for Structure and 59.0% for Process: in addition 71.8% of the products were clean. In the Preparation operational stage, 50.0% of the Results indicators were in compliance for Structure and 66.7% for Process. In the Sterilization, Storage and Distribution stage, 43.5% compliance was obtained for Structure, 55.7% for Process and 78.6% for Packaging conservation. Appreciative planning proposed improvements to the physical structure, review of processes and protocols, promotion and appreciation of the work done and strengthening of teaching about processing and service management, highlighting the protagonism of the group and of the leaders. **Conclusion:** using indicators was positive in materializing reality; however, it was verified that the improvements proposed are related to people. The affirmative and constructive view of Appreciative Inquiry presented itself as a path to changes and quality improvements.

Descriptors: Medical Devices; Quality of Health Care; Quality Indicators; Hospital Units; Hospital Equipment and Supplies; Hospital Departments.

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Introduction

Central Sterile Supply Departments (CSSDs) are the units in a hospital responsible for the Processing of Health Products (PHP). Safety and quality in processing are important protective measures against healthcare-associated infections[1]. Guidelines, recommendations and quality assessment indicators are criteria used in the most diverse health services as a management tool to mitigate possible undesirable outcomes[2-7]. Safety, lower risk and quality are potentialities ensured by the implementation of the recommended practices guided in these publications and by the greater compliance degree in the processing operational stages (Cleaning, Preparation, Sterilization, Storage and Distribution). Conversely, non-conformity creates insecurity, greater risk and failures[2-7].

In the clinical practice, indicators are used to define processes, monitor and evaluate care, carry out situational diagnoses, prepare and review protocols, develop research studies and strengthen the practical activities of the services. They are an option for improving quality and are configured as a management tool subdivided into three dimensions: Structure, Process and Results. These dimensions serve as a guide for planning, evaluating results and promoting changes[8].

As an important part of this quality improvement process, a profile of valued and qualified professionals for CSSDs and with operational capacity for PHP processing plays an important role in promoting safety and in preventing and controlling adverse events (AEs)[9]. In this sense, Appreciative Inquiry (AI) presents itself as an effective approach for intervention in organizations, considering people and the local specificities of a given reality. It is an inquiry process grounded on action-research and based on social existence, reflecting not only a method, but the complexity of being and living in a social organization[10]. This proposal contributes the essence of the factors that generate human behavior, in an affirmative approach anchored in social reconstruction aiming to produce a change. From its positive core, teams discover, dream, design and create their desired destiny[11].

Considering the scenario described, we ask: "Which is the best path for CSSD services, regardless of reality, to evaluate their processing and envision possibilities for improvement actions?" Thus, the objective of this study was to analyze the use of quality assessment indicators and their implementations to improve quality in the processing of health products.

Method

Study design

A mixed-methods study (quan — QUAL) with a sequential explanatory strategy[12-13], carried out in two phases: Phase I — quantitative, multiple case studies[14] were used to understand PHP processing based on quality assessment indicators for Structure, Process and Results. The Structure refers to human and material resources, the Process are related to the dynamics applied to the practice, and the Results measure the frequency with which events happen for each PHP processing stage[15-16]. In qualitative Phase II, AI[10-11,17] was used, which contributes an innovative approach based on Constructivism, focused on an evaluation to assess and propose changes. The strategy established is grounded on the research time distribution, the weight of the data, the data combination procedure and the theorization of the results[12-13].

The practical operationalization of the AI application model is called 4-D cycle (*Discovery*, *Dreaming*, *Design* and *Destiny*[10-11,17]. Discovery seeks to understand what motivates the group in the face of the problem or challenge posed. Dreaming is the call for the group to think collectively about its highest purposes. Design deals with the proposals suggested by the dreams and outlined by the group, to achieve positive results. Destiny is the moment to create the affirmative action plan[10-11,17].

Study locus and period

The research was carried out from March 2018 to October 2020 in four hospital units that make up the largest hospital complex in the reference network from the state of Rondônia; with more than 1,000 beds and 96 Nursing professionals (including nurses, technicians and assistants), directly involved in PHP processing and located in a municipality from northern Brazil.

Case A is a general hospital with 576 beds and a Class II CSSD (it processes non-critical, semi-critical and critical PHP of complex and non-complex conformation), centralized for critical PHP processing and with 45 professionals. Case B is an Emergency Department with 187 beds and a Class II CSSD, centralized for critical PHP processing and with 30 professionals. Case C is a hospital for the treatment of infectious diseases with 100 beds and a Class II CSSD, partially centralized and with 11 professionals working in the unit. Finally, Case D is a unit specialized in pediatric care with 145 beds and a Class II CSSD, partially centralized and with 10 professionals for PHP processing.

Participants

The sample was for convenience. In Phase I (quan), all professionals from the Nursing team working in all four CSSDs were invited, that is, those directly involved in processing; in turn, those who were on vacation or leave during the study period were excluded (96 professionals were part of the Nursing team directly involved in the CSSD; of these, 59 took part in the study, eight were nurses responsible for processing in the units, 41 were nursing technicians and ten were assistants). In Phase II (QUAL), only the following people were invited to participate: the technical managers in each CSSD and professionals from the Patient Safety Center (*Núcleo de Segurança do Paciente*, NSP) and from the In-Hospital Infection Control Service (*Serviço de Controle de Infecção Hospitalar*, SCIH), indicated by the units and involved in PHP processing management and planning (ten professionals participated: all nurses, six from the CSSD, one from the NSP and three from the SCIH; all four hospitals were represented with at least two participants). In the first contact with the participants, in each phase, the study objectives were clarified and they were asked to read and sign the Free and Informed Consent Form.

Data collection

The integrated and sequential description of the methodological collection procedures for Phases I and II are presented in Figures 1, 2 and 3.

Phase I – Quantitative Study	
Question: Which are the PHP processing quality assessment indicators for Structure, Process and Results of the multiple cases?	
Phase - Quantitative data collection - Structure, Process and Results indicators	
Techniques/Procedures	Products
Multiple case studies[14] and two quantitative instruments were used (all were subjected to a pilot test at one of the study units in February 2018 with three participants to adjust the research questions, although these results were not included in the study), as well as an algorithm for cleaning assessment, described below: 1. Structured interview script — We carried out the sociodemographic characterization of the Nursing team professionals involved in PHP processing at the four units. 2. Quality assessment indicators corresponding to PHP processing for Structure, Process and Results[15-16] and a structured and semi-structured script with process indicators applied to the CSSD technical manager[16] — They were applied per operational stage, and all the information was obtained by means of observations, recording and/or interviews[15-16]. The Structure and Process indicators were classified by means of “Compliant”, “Non-compliant” and “Not applicable” scores. 3. As a Results indicator for the Cleaning operational stage, the Adenosine Triphosphate (ATP)® test (3M Clean-Trace brand for surface — Swab) was used, associated with the Whiteley algorithm[18].	- Sociodemographic characterization of the cases. - Structure, Process and Results indicators per PHP processing operational stage and per case.

Source: Adapted from Creswell; Plano Clark[12]

Figure 1 - Description of the methodological procedures of the mixed-method with sequential explanatory strategy — Phase I: Quantitative. Porto Velho, RO, Brazil, 2020

Structure indicators[15-16]

a) Cleaning: caster systems; sink configuration; taps; suitable brushes for all types of PHP; water/air guns; sharps containers; containers for biological material waste; minimum dimensions; physically isolated area; lighting; air conditioning; screened windows; finishing material; physical barrier for preparation; supplies for hand hygiene.

b) Preparation: area located between Cleaning and Sterilization; minimum dimensions; lighting; intensifying lens; compressed air gun; sealing equipment; supplies for hand hygiene.

c) Sterilization, Storage and Distribution: dimensions; architecture; area separated from the others; area located between preparation, storage and distribution; screened windows; pre-vacuum and low temperature autoclaves; sanitary barrier autoclave; restricted area; air conditioning; shelves' distance from the floor, walls and ceiling; shelves used; storage location free from water sources, open windows and exposed pipes; gross accumulation of dust, trash, and presence of rodents or insects; supplies for hand hygiene.

Process indicators[15-16]

a) Cleaning: use of detergents; product labels used with registration, information on dilution, necessary PPE, indications and contraindications; dilution, immersion time and shelf-life after dilution follow the manufacturer's recommendations; changing the detergent solution following the recommendations; prior submersion of dirty materials in disinfectant chemical solutions; manual and/or automated cleaning; manual washing piece by piece and with soft bristle brushes; friction under running water and water with solution; absence of abrasive materials; complex and cannulated PHP cleaning with brushes of suitable diameters, complemented with ultrasonic washer; thorough rinse; automated cleaning prioritized for PHP with complex conformation; documented equipment qualifications; periodic evaluation of the equipment; Personal Protective Equipment (PPE) available and used; drying; and hand hygiene.

b) Preparation: inspection with a magnifying glass regarding conditions and conservation; completely dry PHP; types of packaging; packages in the maximum recommended size; chemical indicator (Class I); package closure; identification; PPE; routine for decontaminating benches; hand hygiene.

c) Sterilization, Storage and Distribution: temperature, cycle time, records of autoclave parameters; arrangement of packages; used capacity of the device; wet packages, transferred hot to storage, with older dates in front of newer ones; shelf-life considered at the institution and checked; PHP distribution control recording system; PPE; hand hygiene.

d) Interview with the technical manager: exclusive nurse; standards and routines manual; permanent education program; sharps accident policy; management of essential aspects of the stages (water quality, equipment maintenance, packaging quality, rational use of chemical indicators, etc.); participation in purchasing processes.

Results indicators[15-16,18]

$$\frac{\text{Number of compliant and applicable components in the CSSD under evaluation x100}}{\text{Total applicable components}}$$

Source: Adapted from Graziano, et al.; Mendonça, et al.[15-16]

Figure 2 - Synthesis of the Structure, Process and Results indicators — Phase I: Quantitative. Porto Velho, RO, Brazil, 2020

Phase II – Qualitative Study	
Question: How did the professionals experience the elaboration of an appreciative plan based on knowledge about their PHP processing assessment indicators?	
Phase - Qualitative data collection - Planning workshop	
Techniques/Procedures	Products
1. Presentation of the indicators by unit (Cases); Phase I results. 2. Elaboration of the Plan: In this Phase, the AI frameworks were used for data collection and analysis[10-11,17,19]. In all four phases of the AI cycle we started with a question, to then apply the strategy to build the product proposed. *1st D: Discovery* — Question — "Based on your experience at the CSSD, which positive aspects do you identify for PHP processing in your units?". Strategy — The professionals were divided into two subgroups with five members. Each person received five fliers (a number defined only to ease the strategy, considering the number of participants and space) to point out positive aspects that they believed existed in their CSSD. All fliers were glued to the whiteboard. *2nd D: Dreaming* — Question — "Which are your dreams for an ideal future of PHP processing at your unit?". Strategy — Considering the positive aspects, A4 sheets were distributed so that they could individually represent their dreams for improving the CSSD (free production: drawings, figures, words, etc.). After each person presented their individual production, we divided them into two subgroups to transcribe their dreams into written proposals. All proposals were pasted on the whiteboard. *3rd D: Design* — Question — "In your opinion and according to your experience working at the CSSD, which dreams can be fulfilled? Which goals can be set to achieve these dreams? How long does it take to reach them?". Strategy — With the group's dreams described and displayed on the board, they were asked to choose those considered possible for implementation. From then on, a chart showing all of them was created to record the goals and deadlines. *4th D: Destiny* - Question - "What needs to be done to achieve the goals? Which actions need to be taken to achieve the goals? Who is responsible for carrying out these actions?". Strategy — Completing the plan, the necessary actions for each proposed goal and those responsible for execution were listed. Total duration of the workshop: 16 hours.	Elaboration of a Plan in the IA Frameworks for the Units with a proposal for expansion to other state services.

Source: Adapted from Creswell; Plano Clark[12]

Figure 3 - Description of the methodological procedures of the mixed-method with sequential explanatory strategy — Phase II: Qualitative. Porto Velho, RO, Brazil, 2020

Data analysis and treatment

The quantitative results were organized and presented in tables with absolute and relative frequency using percentages of the indicators evaluated as "compliant" using the Stata® statistical package, version 13.0. The qualitative results were analyzed descriptively, anchored by the following principles: constructionist (it unites personal constructions with organizational destiny); simultaneity (it unites research and change); poetic (it highlights the way people confer authorship to their world); anticipatory (it understands that constructive organizational change will be informed by the way people think about the future); and positive (positive thinking and knowledge are directly associated with people's involvement in the research process), grouped and presented according to the AI 4-D cycle stages; all based on records, photographs, notes from the group process and field diary[10-11,17,19].

The qualitative results were integrated and combined using the triangulation strategy (Characterization of the participants + Indicators + AI principles), aiming at convergences, divergences and/or combinations. To ensure credibility, transferability, reliability and confirmability of the results, in both phases we included a researcher who was an expert in the methodology employed to validate data collection and analysis, following this procedure: 1) Exhaustive

reading of the material; 2) Separation of the qualitative results from the quantitative ones; 3) Analysis of convergences/divergences and their combinations; and 4) Preparation of the base text of the results, prepared by the researcher and subsequently analyzed and validated by the expert researcher. However, it is worth noting that, in the case of AI, the researcher's experience and interaction with the group constitutes part of the reflexivity found in the construction of the Appreciative Planning discussion.

Ethical aspects

The original project of the study obtained favorable opinion from the Research Ethics Committee of the Federal University of Rondônia in 2018, under Certificate of Presentation for Ethical Appraisal number 58757316.6.0000.5300 and Opinion number 2,829,233.

Results

Fifty-nine professionals from the Nursing team participated in the first phase, eight of whom were nurses responsible for processing at the CSSD. Case A — It had 45 professionals: nine were on some medical certificate or leave and 10 refused to participate. 26 professionals took part, representing 57.8%: four were nurses. Case B — It had 30 professionals: two were on some medical certificate or leave and 11 refused to participate. 17 professionals took part, representing 56.7%: three were nurses. Case C — It had 11 professionals, two were on some medical certificate or leave and nine participated, with one nurse among them, representing 81.8%. Case D — It had ten professionals, two were on some medical certificate or leave and one refused to participate. Seven of them took part, representing 70.0%: all were nursing technicians.

Regarding the profile of the 59 Nursing team professionals interviewed: 13.6% were nurses, 69.5% were nursing technicians, predominantly female (96.6%), with Higher Education (57.6%), aged over 55 years old (34%), with Nursing practice time equal to or over 21 years (39.0%) and with time working at the hospital unit and in the CSSD equal to or less than five years (32.2%; 55.9%), respectively.

Considering the compliance scores, the best Structure scenario taking into account all processing stages was Case A. In turn, for the Process indicators, the highest frequency of conformities was in Case C. Case B presented less compliant Structure and Process in all stages.

In relation to the Results indicators, in all stages the Structure dimension presented fewer items evaluated as "Compliant" when compared to the Process dimension, although Case A presented the highest conformity in the Structure dimension for all stages evaluated (Table 1). The ATP test indicated that 71.8% of the PHPs were clean, with Case A presenting the worst result (54.9%).

The Process dimension presented the highest compliance percentage in the Results indicators of the Preparation stage (66.7% of the total evaluated). In relation to the Sterilization, Storage and Distribution results indicators, the Structure was evaluated with less than 50% of the items as "Compliant" and Case A presented the lowest percentage of packages evaluated as "Compliant" (50.0%).

Table 1 - Distribution of the frequency of conformities regarding the quality assessment indicators for the result of the operational stages for the processing of health products in Central Sterile Supply Departments of hospitals from Porto Velho (n=596). Porto Velho, RO, Brazil, 2020

Dimension	Cleaning stage results indicators								
	Case A		Case B		Case C		Case D		All
	Compl. (Total)*	%	Compl. (Total)*	%	Compl. (Total)*	%	Compl. (Total)*	%	Compl. (%)
Structure	12 (17)	70.6	05 (17)	29.4	07 (17)	41.2	08 (16)	50.0	32 (47.8)
Process	17 (29)	58.6	11 (27)	40.7	19 (25)	76.0	12 (20)	60.0	59 (58.4)
Clean products (ATP Test)	28 (51)	54.9	34 (39)	87.1	23 (37)	62.1	32 (36)	88.8	117 (71.8)

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Dimension	Preparation stage results indicators								
	Case A		Case B		Case C		Case D		All
	Compl. (Total)*	%	Compl. (Total)*	%	Compl. (Total)*	%	Compl. (Total)*	%	Compl. (%)
Structure	06 (07)	85.7	01 (07)	14.3	02 (07)	28.6	05 (07)	71.4	14 (50.0)
Process	06 (11)	54.5	05 (10)	50.0	09 (11)	81.8	08 (10)	80.0	28 (66.7)
Dimension	**Sterilization, Storage and Distribution results indicators**								
	Case A		Case B		Case C		Case D		All
	Compl. (Total)*	%	Compl. (Total)*	%	Compl. (Total)*	%	Compl. (Total)*	%	Compl. (%)
Structure	08 (16)	50.0	05 (15)	33.3	07 (15)	46.7	07 (16)	43.8	27 (43.5)
Process	10 (21)	47.6	08 (20)	40	13 (17)	76.5	13 (21)	61.9	44 (55.7)
Packaging conservation	50 (100)	50.0	95 (100)	95.0	100 (100)	100.0	30 (50)	60.0	275 (78.6)

*Compl. (Total) = Absolute number of items assessed as "Compliant" out of the total number of items evaluated — Information presented in parentheses

In relation to the indicators collected with the CSSD technical managers, when considering managerial aspects, the reported conformities were greater than the non-conformities. In all units, the technical manager was a nurse: only in one was the professional exclusive to the CSSD, in the others they performed other functions in the unit. The unit that had an exclusive technical manager presented the best performance in these indicators. The compliant components in all cases were as follows: monitoring policies for sharps; nurses' participation in purchase decisions: bench decontamination routine; sealing equipment maintenance; sterilization equipment preventive maintenance; routine for rational use of integrators; sterilization control; and recording of the chemical, physical and biological controls. The non-compliant components in all cases were the following: absence of permanent education programs; water treatment for rinsing health products; control of the number of times cotton fabrics are reused; sterilization control by biological indicators for implant and/or prosthesis materials; release of sterilized implant and/or prosthesis health products based on the results of the biological indicators.

Appreciative planning for quality assessment

This phase was initiated by presenting the results of the Structure, Process and Results indicators from Phase I to the ten participants, case by case. The data related to the 4-D cycle described by the researcher and validated by an expert researcher are presented below, considering the records made during the workshop. The *Discovery Stage — 1D* evoked feelings of motivation, hope and confidence in the participants. The group's movement indicated protagonism in the change process, presence of the topic of processing assessment indicators, centrality in the experience, positivity, a strong interaction between members and significant involvement of the leaders. The positive aspects identified by the professionals for PHP processing were the following: partnerships for updates and training sessions; accessibility to products and posters; commitment of mid-level leaders; centralized CSSD; nurses' autonomy; suitable wraps and techniques for packaging; team commitment; qualified labor and cutting-edge products; established routines; and access to technology and inputs, as well as operationalization of a unidirectional PHP flow.

The *Dreaming Stage — 2D* maintained the feelings from stage 1D. The group's movement indicated convergence with the processing assessment indicators; quality improvement for evaluation, management and the team; figure of the central leader in directing the dreams; and the historical process materialized in dreams. The individual dreams were grouped into collective ones

and translated into proposals: 1. Visibility of the CSSD and of nurses' work; 2. PHP processing teaching at universities; 3. Appreciation of the work done; and 4. Better structure. It is noted that the infrastructure issue was the most cited among the participants.

In the *Design Stage — 3D*, the group showed some resistance in thinking about which dreams would be feasible. Discussions took place, as some participants not believed that nothing could be done. One of the members, a noticeable leader among the participants and belonging to the professional group from Case A, reported his experience in managing planning at the CSSD, using negative things to achieve positive goals, generating acceptance from some through expressions of validation of this thought. The experience of the group members guided by the leader was superior and a protagonist in elaborating the process. Seeking to restore positivity, the researcher invited the group to review the quality assessment indicators for the CSSD, highlighting their use as a facilitating tool to prepare the plan. The group's behavior consisted in ignoring this proposal and firmly continuing with their experiences, which carried along all the meanings that belonged to them and were important for them to think about the future and create it. Despite the collaborative relationship between the group and the researcher, their practice stood out against the diverse evidence presented by the researcher. The stance and commitment factor between both was not enough for change: the central aspect was "being part of the construction". Thus, the group began to prepare a flowchart of the collective dreams selected, also seeking some references in the individual dreams that gave rise to the group's, relating them to their respective goals and schedules.

A feeling of anxiety was found in the *Destiny Stage — 4D*. Each of the goals required actions to be developed, with due designation of those responsible for executing them. For the "improvements in the physical structure" goal, the actions proposed were the following: make a diagnosis of the physical structure based on the legislation; and present a situational report with proposals for improvements based on the legislation (deadline: one month). The following was proposed for "improvement in work organization": review the already existing processes and reformulate those that are necessary; carry out audits and review and update the Standard Operating Procedures (SOPs); and publicize the SOPs through meetings, training sessions, lectures and continuing education (deadline: three months).

For the "encouraging teaching about CSSD" goal, the actions proposed were as follows: publicize the CSSD as an internship field for educational institutions; and welcome teachers through technical visits (deadline: six months). For the "promotion of work appreciation in the CSSD" it was proposed to collect data together with the Patient Safety Center (NSP) and the In-Hospital Infection Control (SCIH) sector, prepare reports and meet with the management to present data, indicators and reports and reinforce the impact on the assistance provided (deadline: one year).

Finally, the following was proposed for the "strengthening the CSSD at the managerial level" goal: assemble a committee among the state's CSSDs; promote quarterly meetings between the CSSD, NSP and SCIH to strengthen the actions; and formulate the commission's organizational chart, work plan, regulation and schedule (deadline: six months). At the end of this stage, PHP processing planning was expanded to other CSSD public units in the state.

Discussion

The predominance of the Nursing team as a workforce in CSSDs, as is the case in other studies[20-22], and the incidence of product processing, most of the times centralized in a single unit at the hospital (CSSD), proved to be the guiding thread of an inseparable historical path between Nursing and CSSDs. The past from the AI perspective can indicate both a positive view of organizational change, such as the potential of dreams, and a process full of learning[9,11,23].

The profile with experienced professionals, advanced age and short time working in the CSSD was similar in some studies and divergent in another[16,21-23], highlighting the importance of discussing the professionals' profile for PHP processing. Diverse evidence indicates the need for skills that guarantee quality and safety, as these professionals are a central and essential component of all aspects involving processing[24-27]. All this information is consistent with the group's perception presented in the intervention with AI, expressed by the desire for visibility, appreciation and encouragement in training[10-11,20].

The low compliance of the Structure indicator, in most units and in all operational stages, and the desire revealed in appreciative planning, show that even without a specific tool, the group points out what it needs. The results portray the difficulty in compatibility of the recommended physical structure, with good environmental conditions and established flows. Regarding this aspect, it is important to highlight that the infrastructure conditions may contribute to failure of the processes.

The group reflects the contextualized reality based on their personal constructions, characterizing the potential

for change according to the AI principles, shown by the "improvement of the physical structure" proposed goal[27-28]. A study carried out in a health unit with a high satisfaction level among professionals and users alike applied this methodology to the team of clinical nurses and managers to explore their perceptions, further leverage satisfaction and promote improvements[29]. Taking into account that the structure components are less actionable for an effective improvement process, AI use can point to a more appropriate path.

The best compliance frequencies among the Process indicators in the operational stages evaluated and the number of actions proposed for implementation in appreciative planning reflect that the Process dimension components are more feasible and accessible for change. The essence of the Process dimension constitution is accessibility and actions carried out for the service[30-31]. It has more potential for success and indicates the best to be done, such as reviewing existing processes or presenting a situational report, among others[31]. The discussion of the Results indicators for Cleaning in association with the ATP algorithm required developments in another study[32].

The best assessment indicators for PHP Structure and Process were evidenced in Cases A and C, respectively. In AI, the nurses responsible for these units emerged as leaders during the workshop: they led the entire planning construction process. Leadership represents the foundation of change and of the improvements that strengthen individuals and the system. Leaders are provided with competence, creativity and relationships that adjust the various components for the system to work as a whole. Health unit leaders work every day towards improvements and quality[26,33].

In this context, the nurses' leading role refers to adaptable and autonomous professionals. Associated with an appropriate management model, their effective leadership outlines successful implementations; the responsibility to find the best way to operate the process falls on nurses[34]. This reality was reflected by the positivity and protagonism found in the group, that is, the process core and purpose alignment indicate good prospects for change.

In any reality, clinical practice centered on professionals tends to generate an improvement impact on the indicators; however, in adverse conditions, the team's participation in the development of change processes can generate an even greater impact. Some studies show changes generated by people working in the services that impacted improvements in the practices[19,35-40]. This vision for PHP processing is developed from "what could be" towards "what can be and what is possible to do" [41-42].

Working on improvements, first and foremost considering cooperation of the people involved in the organization, is also reported in another study[19]. These successful experiences reinforce the necessary change in the approaches carried out in the clinical practice, moving away from protocolled and universal approaches to others centered on the group of professionals.

The planning predicted improvements in the teaching of PHP processing and professional appreciation, which appears to be directly linked to CSSD visibility issues. A similar result was found in a study which indicated that role and visibility are factors that affect PHP processing work. The professionals reported feeling undervalued, invisible or not understood[26]. Another study, also conducted with a CSSD Nursing team, identified similar discourses about the importance and appreciation of work, professional appreciation, workload, overload, human resources deficit and inadequate working conditions[22].

The results of this study are related to the improvement trends for PHP processing. However, what seems central to any reality that envisions improvements is to value the professionals' participation in outlining a plan to achieve their best performance and commitment levels, as already done by other studies[19,30,36-39].

The study contributions to scientific knowledge advancement are as follows: improvement proposals; assessment instruments and CSSD management plans centered on and starting with the team of collaborators; and technical managers-nurses as leaders who directly influence the team and all processes.

Study limitations: AI is a qualitative methodology that involves the researcher's active participation, which can generate bias in data interpretation; in addition, the descriptive data analysis, considering the AI principles, limited an in-depth analysis of the group activity.

Conclusion

The assessments made in all four CSSDs identified organizationally different units comprising the same scenario in the region. The profile found corresponded to workers at the end of their careers and with one to five years of experience working in CSSDs. The Process and Results indicators for clean PHP and packaging conservation achieved better compliance rates when compared to those for Structure. Using indicators proved to be a substantially important tool, as it managed to materialize processing in the reality evaluated. Technical potentialities and weaknesses were evidenced through them.

To leverage changes and improvements for the service, the group's leading role was essential, especially

in appreciating the experiences and actions of leaders who stood out in all AI phases and were associated with the historical process of Nursing professionals, mainly nurses. Working from a positivity and potentiality perspective also presents itself as an opportunity for a diversified and sometimes adverse clinical practice, where resources are scarce. The implementations devised in the appreciative plan for PHP processing signaled that the change and quality improvement process will be proportional to the relevance given to the people that perform this task. From this stage onwards, the intention is to develop processing assessment instruments and plans for CSSDs, built on a team basis, in order for us to develop greater efficiency and effectiveness in continuous changes and quality improvements.

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