



The role of central sterile supply department nursing team members: an integrative review

Papel dos trabalhadores de enfermagem no centro de material e esterilização: revisão integrativa

Papel de los trabajadores de enfermería en la central de esterilización: revisión integrativa

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ABSTRACT

Objective: to analyze the role of nursing team members in Central Sterile Supply Departments. **Methods:** an integrative review was conducted. Comprehensive searches were conducted in CINAHL via EBSCOhost, IBECs, LILACS, MEDLINE via PubMed, and Scopus. Constant comparison method was applied to analyze the study findings. The initial subgroup classification was based on the King's Conceptual System's concept of role. **Results:** twenty-nine research articles were selected. Three categories emerged: Central Sterile Supply Department (CSSD) nursing team members' perceptions of their role; Consumer department workers' perceptions of the role of CSSD nursing team members; and CSSD nursing team members' functions. **Conclusion and implications for practice:** the CSSD nursing team members' functions were conceptualized as indirect care activities. The limited visibility of this department's work leads to a perception of lower status in the hospital organization and role conflicts.

Keywords: Central Supply, Hospital; Nursing Staff; Role; Sterilization; Systematic Review.

RESUMO

Objetivo: Analisar o papel dos trabalhadores de Enfermagem em Centros de Material e Esterilização. **Método:** Realizou-se uma revisão integrativa. Buscas compreensivas foram realizadas nas seguintes bases de dados: CINAHL via EBSCOhost, IBECs, LILACS, MEDLINE via PubMed, e Scopus. O método de comparação constante foi aplicado para analisar os achados dos estudos. A classificação inicial de subgrupos baseou-se no conceito de papel do Sistema Conceitual de King. **Resultados:** Vinte e nove artigos de pesquisa foram selecionados, e três categorias identificadas: Percepções dos trabalhadores de Enfermagem do Centro de Material e Esterilização (CME) sobre seu papel; Percepções dos trabalhadores de unidades consumidoras sobre o papel de trabalhadores de Enfermagem no CME; e Funções dos trabalhadores de Enfermagem no CME. **Conclusão e implicações para a prática:** As funções dos trabalhadores de Enfermagem do CME foram conceitualizadas como atividades de cuidado indireto. A visibilidade limitada da atribuição do CME conduz à percepção de *status* inferior na organização hospitalar e nos conflitos de papel.

Palavras-chave: Almoarifado Central Hospitalar; Esterilização; Papel; Recursos Humanos de Enfermagem; Revisão Sistemática.

RESUMEN

Objetivo: Analizar el papel de los miembros del equipo de Enfermería en Centrales de Esterilización. **Método:** Se realizó una revisión integradora. Se realizaron búsquedas exhaustivas en CINAHL via EBSCOhost, IBECs, LILACS, MEDLINE via PubMed y Scopus. Se aplicó el método de comparación constante para analizar los resultados de las investigaciones. La clasificación inicial de subgrupos se basó en el concepto de rol del Sistema Conceptual de King. **Resultados:** Se seleccionaron veintinueve artículos de investigación. Se identificaron tres categorías: las percepciones de los miembros del equipo de Enfermería del Central de Esterilización (CE) sobre su función; percepciones de los trabajadores del departamento de consumidores sobre el papel de los miembros del equipo de enfermería de CE; y las funciones de los miembros del equipo de enfermería CE. **Conclusión e implicaciones para la práctica:** Las funciones de los miembros del equipo de enfermería de CE se conceptualizaron como actividades de cuidado indirecto. La visibilidad limitada del trabajo de este departamento lleva a una percepción de un estado inferior en la organización del hospital y conflictos de roles.

Palabras clave: Central de Suministros en Hospital; Esterilización; Papel; Personal de Enfermería; Revisión Sistemática.

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INTRODUCTION

The Central Sterile Supply Department (CSSD) is an institutional environment where the necessary and highly specialized processing of health products takes place. Some of its functions include acquiring, receiving, cleaning, decontaminating, packaging, sterilizing and providing reusable, processed and safe health products for clinical procedures performed in consumer units, such as wards, Intensive Care Units, outpatient clinics and surgical centers. These procedures require qualified and well-trained teams and specialized equipment.¹

Health Care-Associated Infections (HAIs) are characterized as adverse reactions to infectious agents or toxins, which were not present or were incubating at the time of admission to a health facility.² Although common, HAIs are responsible for serious damage to health and increased treatment costs.³ The CSSD is essential to control HAIs.⁴

Considering that the CSSD is important for HAI health care safety and control, it is important for a better understanding of the role of nursing team members. Our goal is to analyze the role of nursing team members in the CSSD. In this sense, the research question that guided this review is: what is the role of nursing team members in the CSSD? We seek to contribute with knowledge on CSSD work and deepen the debate on the possible roles that nurses in these centers play around the world, gathering information about the phenomenon of the CSSD managed by nurses, from the perspective of nursing.

We seek to interpret the phenomenon by conceptualizing the role of nursing in the CSSD, using King's Conceptual System. The role concept integrates interpersonal systems and is related to other concepts in personal and social systems.⁵ In other words, paper identifies the Self, the Other and how their interactions achieve objectives. In the formal organization, hospital, for instance, the role of a person or group is composed of a set of functions, which are assigned to those who occupy that position within an organization and who have a certain status. Perceptions influence the understanding of the role. When other members of an organization inadequately perceive a worker's role, role conflicts might arise, and in turn, lead to a stressful organizational environment.

METHOD

This article presents an integrative review, a research synthesis method that analyzes the available literature to build a comprehensive understanding of some phenomenon. The method was conducted in five stages: formulation of the problem, literature search, data assessment, data analysis and presentation.⁶

In the first stage, the role of CSSD nursing team members was identified as the research problem, which structured the question using the PICO format.⁷ The following inclusion criteria were applied: articles on the performance of nursing team members in the CSSD; articles published from 2001 to 2019, in English, Portuguese or Spanish. The following exclusion criteria were applied: review articles and reflection articles.

In the second stage, database searches were carried out at CINAHL via EBSCOhost, IBECs, LILACS, MEDLINE via PubMed, and Scopus, in October 2019. Comprehensive search strategies were built for each database, available by email. Chart 1 shows an example.

In the third stage, the primary research articles were assessed using the eligibility criteria and then critically assessed in relation to their contributions to build a comprehensive understanding of the role of CSSD nursing team members. The articles were classified into satisfactory and unsatisfactory. Two research articles that were considered unsatisfactory in the full-text assessment phase were excluded. In the fourth stage, the findings of the study sample were ordered, coded, categorized and summarized by applying the constant comparison method approach for integrative reviews.⁶ The initial subgroup classification was based on King's Conceptual System's role concept.⁵ In the fifth stage, the review report was organized, reviewed and presented in this article format.

RESULTS

The study sample consisted of 29 articles. Figure 1 illustrates the study selection process. The main findings of studies were identified and summarized in Table 1.

When analyzing the findings in the light of the concept of role according to King's Conceptual System, we identified three categories: *CSSD nursing team members' perceptions of their role*; *Consumer department workers' perceptions of the role of CSSD nursing team members*; and *CSSD nursing team members' functions*. Figure 2 presents a model of the main factors that influence the role of CSSD nursing team members.

CSSD nursing team members' perceptions of their role

Occupational Risks

CSSD nursing team members were aware of their exposure to physical, ergonomic, biological and psychosocial occupational risks, and the importance of correctly using individual and collective protective equipment (A1, A4, A5, A6, A11, A17, A27). Poor

Chart 1 – Search strategy applied in MEDLINE via PubMed. Brazil, 2019

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(("nursing care"[MeSH Terms] OR ("nursing"[MeSH Terms] NOT "breast feeding"[MeSH Terms]) OR "nursing, team"[MeSH Terms] OR "nurse practitioners"[MeSH Terms] OR "nursing services"[MeSH Terms] OR "practice patterns, nurses"[MeSH Terms] OR "economics, nursing"[MeSH Terms] OR "nurses"[MeSH Terms] OR nurse[Title/Abstract] OR nurses[Title/Abstract] OR nursing[Title/Abstract]) AND (("sterilization"[MeSH Terms] NOT "sterilization, reproductive"[MeSH Terms]) OR "central service"[Title/Abstract] OR "central services"[Title/Abstract] OR "central sterile"[Title/Abstract] OR "sterile processing"[Title/Abstract] OR "central supply"[Title/Abstract])) AND (Journal Article[ptyp]) AND (Spanish[lang] OR Portuguese[lang] OR English[lang]) NOT (Review[ptyp])
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Source: authors (2019)

physical structures made nursing team members uncomfortable in the face of occupational risks, such as exposure to high temperatures and noise pollution caused by autoclaves, sealers, and material transport (A4, A5, A6, A11, A27, A29). Repetitive actions made some CSSD nursing team members eager to work in other departments of the hospital (A4).

The CSSD was perceived as an environment that causes work overload, due to its fast pace and the constant need for training due to high technology dependence (A1, A4, A6, A11, A27). CSSD workers mentioned the lack of professionals, materials and expertise (in the case of

mentioned lack of supplies, shortage of workers, inadequate physical structures, insufficient training, management problems, work overload, inadequate setting of priorities, lack of contact with health workers from other hospital units and the lack of support from managers in solving problems (A13, A14, A15, A20, A21).

Among the factors that facilitate interpersonal relationships in the CSSD, the studies mentioned teamwork, good relationships between managers and operators, institutional incentives for personal development and good infrastructure (A3, A15, A28). Personal attributes such as a sense of cooperation, proactivity, ethical behavior, commitment and personal choice to work at CSSD were important to establish good relationships among the CSSD nursing team members (A3, A15). Good interpersonal relationships in the CSSD were considered crucial to the

Interpersonal Relations

Barriers and facilitators in good interpersonal relationships in the workplace were identified. Among the barriers, studies

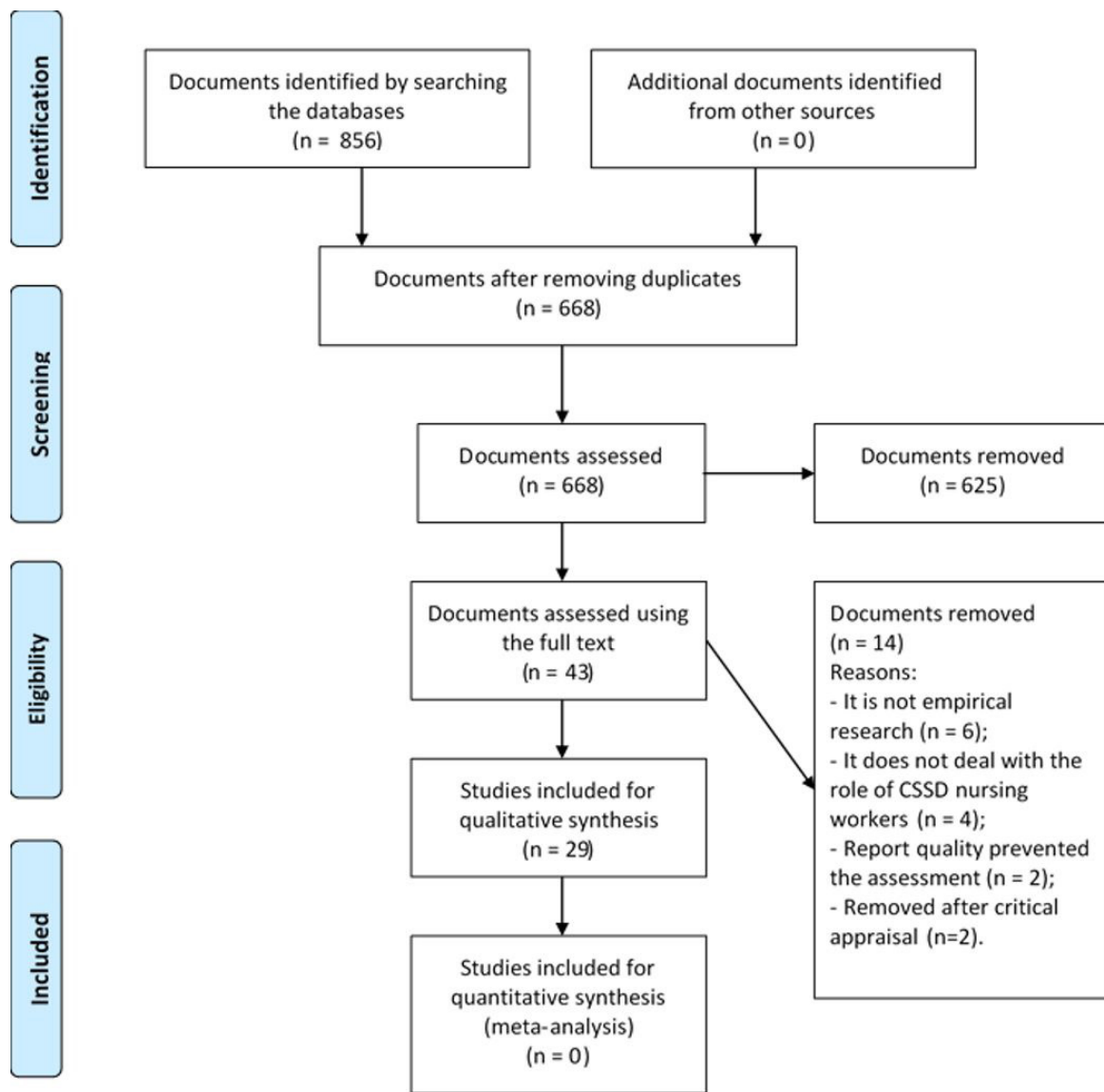


Figure 1 – PRISMA flowchart
Source: authors (2018)

Table 1 – Identification of articles and main findings. Brazil, 2019

ID	Year	Main findings	DOI or URL
A1	2018	Circulation among nursing team members from different hospital sectors in the CSSD, selection based on workers' desire and technical-scientific capacity, implementation of Continuing Education strategies for CSSD workers and on CSSD work in other sectors, and increased communication between the CSSD and other hospital sectors, nursing team members are proposing to give greater visibility to their work at CSSD.	10.1590/0104-07072018006530015
A2	2016	With a team of one coordinating nurse and ten volunteer nurses, the Health Expeditionaries Association (<i>Associação Expedicionários da Saúde</i>) established a Surgical Center and a CSSD in a field hospital in an indigenous village, in the northern region of Brazil. The process had five stages: preparation of material and equipment at the distribution center; logistical preparation of the expedition assembly; assembly of SC and CSSD; disassembly of SC and CSSD; and return of materials and equipment to the distribution center.	10.5327/Z1414-4425201600030007
A3	2016	Some characteristics of the CSSD nursing team at a general hospital in Rio de Janeiro are: of the 34 workers interviewed, 9 were nurses and 25 nursing technicians. Twenty-two were female, 15 were between 25 and 35 years old and none were over 55 years old; 13 had up to 5 years of training. Eleven had at least a college degree; 22 worked between 1 to 10 years in the CSSD; 19 worked at CSSD by personal choice and 13 by institutional need; and 21 workers reported having health problems, the most prevalent musculoskeletal disorders.	10.9789/2175-5361.2016.v8i1.3633-3645
A4	2015	A university hospital's CSSD had two floors and the transportation of materials was carried out by ramp from one floor to another, which subjected nursing team members to a heavy burden with repercussions for their health. The lack of resources was expressed by the participants as one of the main reasons for occupational stress. Ignorance on the CSSD work and care with the dispensing of materials increases the risk of contamination in the CSSD. The high physical effort at work is seen as something positive for workers, although it poses serious health risks. Good interpersonal relationships help workers to overcome the difficulties of working at CSSD.	10.12957/reuerj.2015.15934
A5	2015	Nursing team members characterized the daily work at CSSD of a private hospital in the state of Rio Grande do Sul as a risk to their health, as they were exposed to the handling of sharp materials poorly dispensed by other hospital sectors and excessive noise caused by the machinery and transport of materials. The use of products in the cleaning, chemical disinfection and sterilization of instruments was something that worried nursing team members, as well as exposure to high temperatures from autoclave piping.	10.5935/1415-2762.20150067

Source: authors (2019)

Table 1 – Continued...

ID	Year	Main findings	DOI or URL
A6	2014	Twenty-two nursing team members from two hospitals in the countryside of the state of Pernambuco participated in the research. Eighteen worked 48 hours a week at CSSD and 16 were paid 1 to 2 minimum wages. Thirteen suffered occupational accidents, the most frequent being injuries from sharp objects (5) and autoclave burns (4). 91.9% of respondents stated that their work environment presented a risk of fire, and 89.2% indicated a risk of contact with chemical substance and exposure to noise. Risk of falling materials, injury from sharps and fatigue was mentioned by 86.5% of respondents.	10.4322/sobecc.2014.023
A7	2014	A strategy for quantifying the average daily workload in the CSSD was developed. This strategy was built from the reclassification of packages according to the quantity of materials (in XS, S, M, L and XL) and according to their complexity (in simple or complex); the measurement of the average time for processing these packages, excluding the time when the packages were not under direct handling by nursing team members. An average processing time was achieved for each of the 10 types of packages, which varied between 3 minutes for XS Simple packages and 29 minutes and 34 seconds for Complex SL packages.	10.4322/sobecc.2014.008
A8	2013	Surgical Center and CSSD nursing team members of a public hospital in the state of Rio Grande do Sul knew the stages of washing and preparing the materials, although a CSSD interviewee did not know how to explain the washing process. Few remembered the material inspection process and some (apparently from the Surgical Center) did not know how to describe the sterilization steps and the storage of the surgical material. Few mentioned the control of the indication process and, of those who mentioned, some were confused about the reference of the ribbon color. Inadequacies in physical structure, intense work pace and health risks were addressed. Continuing education was mentioned as a strategy to overcome problems.	10.1590/S0104-07072013000300016
A9	2013	Following a classification of packages according to the quantity of materials (in XS, S, M, L and XL) and according to their complexity (in simple, S, or complex, C), the quantities of processed packages were measured over 122 days by CSSD nursing team members of a university hospital. XSS packages varied between 49 and 829 per day in July, Tuesday was the day of the week that had the most packages processed and the average production was 657 packages per day.	10.5216/ree.v15i1.17314

Source: authors (2019)

Table 1 – Continued...

ID	Year	Main findings	DOI or URL
A10	2013	Some of the activities that nursing team members perform the most in the CSSD daily are supervision of activities performed at the unit (96.78%) and confirmation of the schedule of surgeries, checking the availability of materials and sterile clothing (93.56%). Weekly: monitoring and assessment of maintenance on materials and equipment (25.80%); and tests with products, supplies and equipment (25.80%). Monthly: training (61.30%); and productivity control of the unit (61.30%). Rarely: research development (48.39%) and definition of programs for the prevention of occupational risks and worker safety (35.50%). Never: research development (41.94%) and supervision and control of the use and collection of consignment materials (35.48%).	10.1590/S0104-07072013000400008
A11	2012	Nursing assistants and technicians who worked at a CSSD of a hospital in Rio Grande do Sul showed job satisfaction, although they recognized the physical, biological and chemical risks it offered. High temperatures and poor ventilation were the most cited problems. Interpersonal relationships with managers and staff from other sectors also created problems. Dialogue between managers and workers at the top of the CSSD was the solution pointed out by participants. Regular walks, use of personal protective equipment, immunization and adequate hydration were identified as self-care strategies.	10.1590/S1983-14472012000100016
A12	2011	At the end of the content validation process, six work areas were identified, containing a total of 25 sub-processes with 110 activities of the nursing team. In addition, 28 specific activities of the CSSD nurse were identified.	10.1590/S0103-21002011000200015
A13	2011	CSSD nursing team members of a hospital in Paraíba understood continuing education as a means to gather new knowledge and, thus, improve the quality of service and increase safety in actions and personal satisfaction at work. They also highlighted the need for updating, lack of materials, adequate physical structure and contingent of workers, which lead them to excessive workload.	https://revista.sobecc.org.br/sobecc/article/view/210/pdf-a
A14	2011	CSSD nursing team members of a hospital in São Paulo attributed the importance of their work to assisting service users, mainly to their role in controlling infections and the quality of materials and the fact that they made surgical procedures feasible. However, the participants believed that workers from other sectors of the hospital did not value them and did not know the work performed by the CSSD nursing technician. Teamwork, investment in training and good management were highlighted as the main facilitators of the work at CSSD. Insufficient materials, problems in decision-making are the main obstacles.	https://revista.sobecc.org.br/sobecc/article/view/196/pdf-a

Source: authors (2019)

Table 1 – Continued...

ID	Year	Main findings	DOI or URL
A15	2011	CSSD nursing team members of a hospital in Goiânia identified collaboration, proactivity and ethics as the main driving forces of the Self and stress, demotivation and distrust as self-restraints. As the main driving forces of the Other, the team's integration, motivation and competence were pointed out, and stress, disorganization and irresponsibility were restricted to the Other. As the main driving forces of the environment were air conditioning, the physical structure and availability of protective equipment and as restrictive of the environment the deficit of equipment and supplies, absence of bathroom and resting place in the sector and insufficient workers.	10.1590/S0080-62342011000500022
A16	2010	From interviews with CSSD nurse managers/supervisors from three large public hospitals in Rio de Janeiro, five categories emerged: "Managing the CSSD"; "Living the reality: discovering problems related to human resources"; "Overcoming difficulties (making the job work)"; "Dreaming of the ideal CSSD"; and "Going back to the real: striving for quality through meaning".	10.1590/S0034-71672010000300007
A17	2008	From interviews with CSSD nurse managers/supervisors from three large public hospitals in Rio de Janeiro, five categories emerged: "Managing the CSSD"; "Living the reality: discovering problems related to human resources"; "Overcoming difficulties (making the job work)"; "Dreaming of the ideal CSSD"; and "Going back to the real: striving for quality through meaning".	https://faenf.cayetano.edu.pe/images/pdf/Revistas/2008/febrero/Indicadores_de_la_calidad_de_vida_en.pdf
A18	2008	Nurses from clinical and surgical inpatient units in a public and a private hospital located in the city of Rio de Janeiro related the nurse's work in the CSSD to management activities. They and associate it with the quality of care provided to clients, although they have declared that they do not know the technical role of a nurse in the CSSD. Participants admit that the view of working in CSSD is often negative, a sector that is known for allocating so-called problematic employees and for not being executed with service users.	http://www.facenf.uerj.br/v16n3/v16n3a13.pdf
A19	2008	Undergraduate nursing students at an educational institution in Curitiba were unaware of the nurse's work at CSSD. Right after a class on working at CSSD, students were able to describe the object, purpose and instruments of work at CSSD and the role of nurses in the sector, as well as its importance for the quality of care provided by the institution.	10.4025/ciencuidsaude.v7i4.6674

Source: authors (2019)

Table 1 – Continued...

ID	Year	Main findings	DOI or URL
A20	2007	From interviews with nursing assistants and technicians from the CSSD of a hospital in Londrina, four categories that configure the general structure of the phenomenon 'Being a nursing team member at CSSD' are: 'Speaking of joining CSSD', in which some pointed out that they did not choose to work at the unit and that they entered without knowing it well and because they contracted pathologies that prevented direct care to users; 'Talking about the work developed at CSSD, which addresses the turnover of workers in the different sectors of the CSSD; 'Experiencing difficulties', which addresses the repetition of work in the CSSD, physical tiredness and work overload; and 'Overcoming obstacles', which deals with the feeling of usefulness and importance of their work as a tool to overcome difficulties.	10.1590/S0080-62342007000400019
A21	2007	CSSD nursing team members of a hospital specializing in orthopedics in São Paulo had problems involving the osteoconjunctive system and muscle tissue as the main work-related health complaint and chronic complaint and as the main acute health complaint problems involving the circulatory system. The main causes of work-related health problems were excessive weight manipulation and demands from the management, while the main cause not related to work was old age.	http://www.periodicos.uem.br/ojs/index.php/CiencCuidSaude/article/download/4980/3229
A22	2007	CSSD nurses from hospitals, clinics and sterilization companies and higher education teachers from Curitiba, after group discussion, identified how the nurse's work object in the CSSD are 'Team' and 'Material processing', as purposes 'Ensuring the quality of the services provided and the team', 'Indirect patient care' and 'Search, improvement and application of new technologies' and as instruments 'Knowledge technologies', 'Communication technologies and interpersonal relationships' and 'Information technologies planning'.	10.1590/S0103-21002007000400014
A23	2006	CSSD nurses from Campinas hospitals identified management as their main activity, which involves planning, preparing administrative and operational instruments, managing material and personnel resources, and supervising. Research activities have not been reported. The relationship between their work and health care was characterized as indirect care, as a subsidy for quality and safety for assistance to users of health services.	10.1590/S0080-62342006000300014
A24	2006	CSSD nurses from hospitals in the city of Campinas attributed a positive value to their work and reported realizing that workers from other sectors attribute a negative value to their work in the CSSD. The nurse's work is identified with the management of the CSSD and processing medical and hospital materials work was perceived as non-routine and inconvenient.	http://seer.ufrgs.br/RevistaGauchadeEnfermagem/article/download/4604/2524

Source: authors (2019)

Table 1 – Continued...

ID	Year	Main findings	DOI or URL
A25	2005	CSSD workers from two public hospitals in the city of Goiânia who had no training in nursing or any training or technical-scientific training in asepsis and antisepsis or notions of microbiology and biosafety occupied 20% of the contingent of workers in the sector. The most frequent previous occupations were 'sanitation and hospital cleaning services' and 'concierge services'. The nursing heads of the institutions admitted all.	10.1590/S0080-62342005000200007
A26	2004	Of the 55 nursing team members, sterilization assistants and nursing students from the city of São José dos Campos who participated in a Continuing Education (CE) activity on working at CSSD, 19 claimed to have participated in some CE activity at CSSD, 16 previously participated upon entering the CSSD and 13 of these continued to be updated. 57.9% of workers stated that participation in CE activities was voluntary, while the others reported having been obliged to participate. Most workers pointed out that they only participate in CE activities when new equipment is purchased and that CSSD nurses are responsible for the initiative to carry out these activities.	10.1590/S0104-11692004000500010
A27	2019	CSSD workers in the state of Piauí addressed the chemical, biological and physical risks involved in their work, the necessary care and institutional support to deal with these risks.	10.9789/2175-5361.2019.v11i5.1161-1166
A28	2019	In Suzhou, China, nurses are responsible for all health product processing functions and unit management. Nurses in their first year of work at CSSD made more packaging kit errors (39.9%) than nurses in their second to fifth year of work (33.8%) and that nurses in their sixth year of work onwards (26.3%). Nurses with five years or more of work can take on management and quality control functions.	10.1186/s12913-019-4007-3
A29	2018	CSSD nursing team members in the city of Uberlândia demonstrated moderate levels of good work-related quality of life. The aspects with the lowest level of satisfaction were related to remuneration and working conditions, whereas those with the highest level were those related to the use of skills and social integration at work.	10.14393/BJ-v34n1a2018-38940

Source: authors (2019)

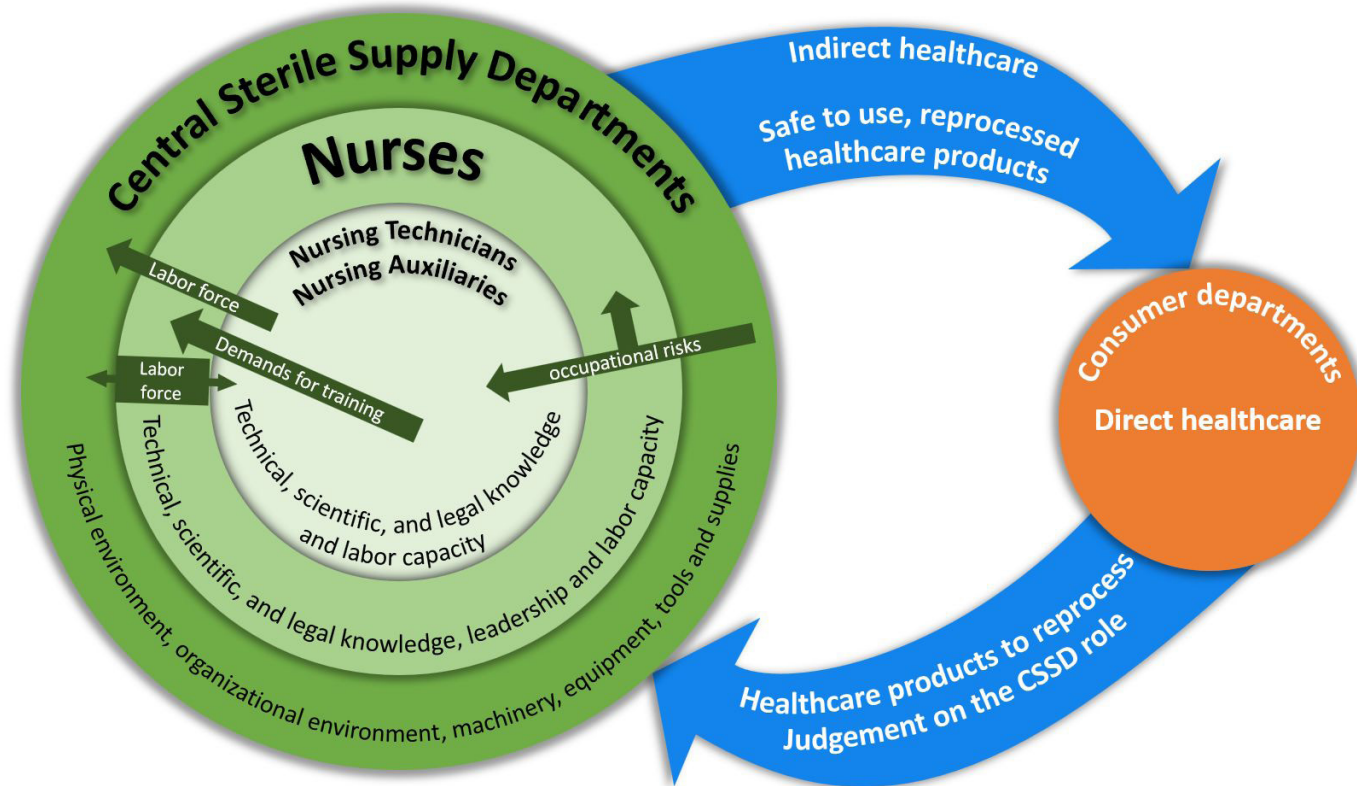


Figure 2 – Model of the factors that influence the role of CSSD nursing team members beginners) as causing burnout (A4, A11).
Source: authors (2019)

commitment, involvement and desire of workers to continue developing their knowledge and skills (A2, A15, A28).

Motivation at Work

The most important factor that influences personal motivation was the choice of an individual to work in a CSSD. In Brazil, it is common to transfer Nursing team members from other hospital units to the CSSD (A3, A14, A20, A29). Two other important factors were the awareness of the importance of the CSSD work for the quality of care in consumer units and the frequent training opportunities (A11, A22, A23).

Some demotivating factors were physical exhaustion related to work overload, repetitive tasks, occupational stress, lack of confidence in colleagues and barriers to training (A20). Being transferred from other units against one’s will (A20, A29), feeling distant from direct contact with patients (A20) and low remuneration (A29) were other factors that demotivate work at CSSD.

Service Training

CSSD nursing team members showed to be aware of the need for constant training in order to carry out processing health products work (A8, A10, A13). Faced with constant advances in the technology used in CSSD, these professionals were interested in seeking new information and qualifications (A10, A13). Furthermore, they mentioned insufficient training as a key factor that negatively affects the quality of service (A8).

Consumer department workers’ perceptions of the role of CSSD nursing team members

Visibility of the CSSD work

Health workers at consumer units demonstrated that they did not know the work done at CSSD and the contributions it brings to consumer units (A1) and, therefore, it is common to not recognize the importance of such unit for the rest of the institution (A16, A20). The lack of visibility of the CSSD, especially in relation to the struggle of the members of the nursing team, leads to dissatisfaction, demotivation and decreased productivity in the CSSD (A13, A16, A20).

Judgments on the CSSD

CSSD nursing professionals found themselves in a double and contradictory situation. On the one hand, they understood the relevance of their work for the safety of health care, its technical and scientific complexity and its heavy workload (A18). On the other hand, they felt powerless and unrecognized by their managers and the health workers at the consumer units (A8).

Even after recognizing the activities of the CSSD, most nursing team members prefer to work in clinical units rather than work at that center (A1). A study revealed a situation in which hospital managers extended the responsibility of the nurse who manages the operating rooms to also manage the CSSD (A27). Another

study showed that nursing professionals from consumer units were transferred to the CSSD due to illness, relationship problems with co-workers or not being willing to keep up to date on the technical and scientific issues required in their positions (A18).

On the other hand, nursing students showed interest in knowing the CSSD (A3). Some CSSD nursing managers try to clarify the relevance of this activity for new workers, a strategy that is also shared among nursing professionals to increase the value of work (A16).

Relationships between the CSSD and consumer units

Many studies have shown that health workers thought that there was no need for vast technical-scientific knowledge to work at CSSD, and underestimated the value of such centers (A1, A3, A8, A10, A14, A16, A20, A24, A27). There was only one exception (A18), which associated the work carried out in the CSSD with the quality of health care. The studies mentioned the exchange of knowledge, including endomarketing activities (A1, A8), as a way to overcome the lack of knowledge about such work.

CSSD nursing team members' functions

Processing of health products

Studies have identified CSSD as support units that conduct a variety of processes and sub-processes, such as reception, cleaning, chemical disinfection, preparation, sterilization, storage and distribution of medical and surgical instruments (A5, A9, A29). The CSSD work is fundamental for the direct care provided at consumer units. In addition, a study described the contribution of nursing team members from this center to the setting up and dismantling of a field hospital in an indigenous village in northern Brazil (A2).

Processing health products requires workers trained to perform the appropriate techniques, as well as knowledge of microbiology, biochemistry, physics and physiology (A8). In China, in Suzhou, only graduated nurses are responsible for the activities of processing health products (A28).

A study validated a list of functions performed by CSSD nursing team members, organizing them in six areas, including the reception of dirty and contaminated material; control of consigned material; preparation; sterilization; storage; and distribution of sterile material and clothing (A12). Twenty-five subprocesses and 110 activities were identified, in addition to the 28 activities that nurses perform exclusively, which relate to the management of human resources, materials and processes (A12). Another study described a process to count the average daily workload of nursing team members at CSSD (A7).

CSSD Management

In Brazil, management is the main activity of CSSD nurses (A2, A5, A8, A10, A12, A14, A22, A23, A26). In China, in Suzhou, only the most experienced nurses in the unit are responsible for these activities (A28). CSSD management involves a number of activities, including: building work scales; the purchase of supplies and instruments; scheduling for maintenance of machines and

instruments; contact with consumer units to receive dirty and contaminated health products and deliver processed products; assessment of quality of service indicators and implementation of training activities, among many others (A10, A12).

Health Care-Associated Infection Control

Studies (A1, A2) identified that the CSSD nursing professionals work contributes to the prevention of HAIs. Health products are processed to reduce or eliminate the existence of microbes; therefore, consumer units directly benefit from the processing of health products carried out by the CSSD, making them safe for use and reducing the risk of HAIs (A8).

Indirect Care

Indirect care is characterized as a result of activities that improve the conditions under which direct care is provided (A22, A27). CSSD indirect care results from the processing of health products and the management performed by nursing team members, so that the consumer units can provide health care directly to patients (A19, A22, A23, A27).

DISCUSSION

Nursing team members at various hospital units used to sterilize products used in health care before it became a centralized service.⁸ As knowledge on cleaning, disinfection and sterilization has advanced, processing health products has become more complex, expensive and time-consuming.¹ In many countries, centralized sterilization services, shortages of these workers and rising labor costs lead us to abandon these activities,⁸ generating the need for the position of CSSD technician. However, in developing countries, such professionals continue to process health products and manage CSSD.

We agree that the knowledge and skills necessary to operationalize and effectively manage a CSSD are highly specific and cannot be adequately taught only in regular nursing courses.⁹ However, countries such as Brazil and China, which have, respectively, more than 1.8 million¹⁰ and 3.5 million¹¹ of nursing team members, employ such professionals in the CSSD. In countries like these, leaving the CSSD to other workers can compromise the income of thousands of nursing team members and cause this unit to lose highly experienced and qualified operators and managers.

Research on mixed methods has shown that several key factors are influencing CSSD's function in the USA. They include: (a) the visibility of the CSSD team and work within hospitals; (b) the relationships and communication established between the members of the CSSD team and other hospital workers and suppliers; (c) personnel and management issues, including hiring, training, licensing, promotion, turnover and leadership structures; and (d) technical problems and solutions, including problems with equipment, labor regulations and work processes.¹²

In consumer units, hospital areas that consume processed health products, clinical teams still have negative judgments and little understanding on CSSD work. As King⁵ predicted, the

low understanding of nursing team members' roles in the CSSD led to role conflicts and stress. Occupational stress and risks have been associated with the CSSD work, such as physical, ergonomic, biological and psychosocial issues,^{13,14} and concern international organizations.¹

CSSD nursing team members conceptualized their work as indirect care.¹⁵⁻¹⁷ Processing products for the benefit of health is essential to reduce health costs and improve the quality of care, directly impacting the risk reduction of HAIs.¹⁸

Given the frequent incorporation of technological innovations in the field of health product processing in the CSSD,¹⁹ CSSD nursing team members highlighted the ongoing demand for in-service training. Keeping up to date, they become aware of technological advances, value and increase the visibility of their work.²⁰

Good relational environments are positively related to job satisfaction and negatively to wear and tear in nursing.²¹ CSSD managers must be aware of how relationships affect the work environment, as motivation, leadership, empowerment and trust are inversely associated with levels of burnout.²² Increasing the emotional intelligence of CSSD workers can improve the team's ability to deal with conflicts, motivate each other,²³ and be more careful in the workplace,²⁴ which can reduce role conflicts and stress.

CSSD's work is highly complex and, therefore, there are many aspects to be studied. Further research can investigate the quality of record keeping, development of protocols and standard operating procedures. They can also assess the CSSD processing steps and in third-party facilities; to measure the effects of occupational stress on CSSD nursing team members; to explore how the conflict of roles influences the effectiveness of work in this unit; and to interpret the history of the relationship between nursing and the processing of products used in healthcare before and after centralization.

The decision to select documents published only in English, Portuguese and Spanish may have prevented the selection of relevant studies published in different languages. There were many sources of information, but varied sources may allow the selection of other important documents.

FINAL CONSIDERATIONS AND IMPLICATIONS FOR PRACTICE

The role of nursing team members in the CSSD is shaped by this center functions in hospital organizations, the perceptions of their workers about their performance and status, and consumer unit workers' perceptions and judgments about CSSD. CSSD nursing professionals' functions involve the processing of health products and management. These functions affect the direct care provided at consumer units. Indirect care at this center prevents HAIs and reduces costs.

There is an appeal to replace CSSD nursing team members with technicians in order to reduce health care costs in developing countries. In this setting, many of these qualified and experienced professionals may have their income compromised. A research

comparing the effectiveness of CSSD led and not led by nursing can inform health policies about the potential role of nursing team members.

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AUTHOR'S CONTRIBUTIONS

Review study design. Acquisition, data analysis and interpretation of results. Writing and critical review of the manuscript. Approval of the final version of the article. Responsibility for all aspects of the content and integrity of the article published. Ricardo da Costa Hercília. Regina do Amaral Montenegro. Rodrigo Nogueira da Silva. · Antonio José de Almeida Filho.

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