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NURSING CONTRIBUTIONS TO ASSISTED REPRODUCTION AND INFERTILITY: AN INTEGRATIVE REVIEW

CONTRIBUIÇÕES DA ENFERMAGEM NA ATUAÇÃO EM REPRODUÇÃO ASSISTIDA E INFERTILIDADE: UMA REVISÃO INTEGRATIVA

CONTRIBUCIONES DE ENFERMERÍA A LA REPRODUCCIÓN ASISTIDA E INFERTILIDAD: UNA REVISIÓN INTEGRATIVA

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ABSTRACT

Introduction: This scientific article addresses the evolution of family arrangements throughout history and the significance of fulfilling the desire for parenthood, which can be hindered by infertility. Assisted Reproductive Technologies have emerged as viable alternatives, with nurses playing a pivotal role, not only technically but also by providing emotional support and understanding cultural considerations. The study aims to map the scientific production concerning nursing professionals' contributions to Assisted Reproduction.

Method: An integrative review was conducted, with search and selection of primary studies performed in February 2022 across five relevant healthcare databases: PubMed, Cumulative Index to Nursing and Allied-Health Literature (CINAHL), Web of Science, Latin American and Caribbean Health Sciences Literature (LILACS), and Scopus. The final sample comprised 10 articles, grouped into three categories.

Results: Through evidence synthesis, categories were developed based on the most addressed themes: "Nurse's role in Assisted Reproduction and fertility", "Qualifications/technical competencies of nurses in Assisted Reproduction and fertility", and "Education programs for training in Assisted Reproduction and fertility".

Conclusion: Competencies such as counseling, patient support, health education, and preparing individuals for the infertility treatment journey with Assisted Reproductive Technologies were identified. This study revealed a lack of formal information regarding Assisted Reproduction in relation to nursing, with limited publications and studies focusing on nurses' competencies in infertility management. This underscores the need for increased scientific production in this domain.

Keywords: Fertilization in Vitro; Infertility; Nurse's Role; Nursing; Reproductive Techniques, Assisted.

RESUMO

Introdução: O artigo científico aborda a evolução dos arranjos familiares ao longo da história e a importância da realização do desejo de ter filhos, que pode ser afetado pela infertilidade. Tecnologias de Reprodução Assistida têm emergido como alternativas viáveis, e o enfermeiro desempenha um papel fundamental, não apenas tecnicamente, mas também oferecendo suporte emocional e compreendendo questões culturais. O estudo tem como objetivo mapear a produção científica sobre as contribuições do profissional de enfermagem com relação a Reprodução Assistida.

Método: Revisão integrativa com busca e seleção dos estudos primários realizadas em fevereiro de 2022, em cinco bases de dados relevantes na área da saúde: PubMed, *Cumulative Index to Nursing and Allied-Health Literature* (CINAHL), *Web of Science*, Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS) e Scopus. A amostra final foi composta por 10 artigos. Os artigos foram agrupados em três categorias.

Resultados: A partir da síntese das evidências foi possível elaborar as categorias conforme as temáticas mais abordadas, são elas: "Papel do enfermeiro na Reprodução Assistida e fertilidade", "Qualificações/competências técnicas do enfermeiro em Reprodução Assistida e fertilidade" e "Programas de educação para formação em Reprodução Assistida e fertilidade".

Conclusão: Foram identificadas competências como aconselhamento, acolhimento, educação em saúde, preparando os indivíduos para a jornada de tratamento da infertilidade com as tecnologias da Reprodução Assistida. Este estudo demonstrou a carência de informação formal sobre Reprodução Assistida quando relacionado a enfermagem, com alguma escassez de publicações e estudos abordando as competências do enfermeiro no manejo da infertilidade, reforçando a necessidade de aumento da produção científica na área.

Palavras-chave: Enfermagem; Fertilização In Vitro; Infertilidade; Perfil de Competências de Enfermeiros; Técnicas de Reprodução Assistida.

RESUMEN

Introducción: Este artículo científico aborda la evolución de los arreglos familiares a lo largo de la historia y la importancia de cumplir el deseo de ser padres, lo cual puede ser obstaculizado por la infertilidad. Las Tecnologías de Reproducción Asistida han surgido como alternativas viables, y los enfermeros desempeñan un papel fundamental, no solo técnicamente, sino también brindando apoyo emocional y comprendiendo consideraciones culturales. El estudio tiene como objetivo mapear la producción científica en relación a las contribuciones de los profesionales de enfermería a la Reproducción Asistida.

Método: Se realizó una revisión integrativa, con búsqueda y selección de estudios primarios llevados a cabo en febrero de 2022 en cinco bases de datos relevantes en el campo de la salud: PubMed, *Cumulative Index to Nursing and Allied-Health Literature* (CINAHL), *Web of Science*, Literatura Latinoamericana y del Caribe en Ciencias de la Salud (LILACS) y Scopus. La muestra final comprendió 10 artículos, agrupados en tres categorías.

Resultados: A través de la síntesis de evidencias, se desarrollaron categorías basadas en los temas más abordados: "Rol del enfermero en la Reproducción Asistida y la fertilidad", "Calificaciones/competencias técnicas de los enfermeros en Reproducción Asistida y fertilidad" y "Programas educativos para la formación en Reproducción Asistida y fertilidad".

Conclusión: Se identificaron competencias como el asesoramiento, el apoyo al paciente, la educación en salud y la preparación de individuos para el viaje de tratamiento de la infertilidad con Tecnologías de Reproducción Asistida. Este estudio reveló una falta de información formal sobre Reproducción Asistida en relación con la enfermería, con publicaciones y estudios limitados centrados en las competencias de los enfermeros en el manejo de la infertilidad. Esto subraya la necesidad de aumentar la producción científica en este ámbito.
Descriptores: Enfermería; In-fertilidad; Fertilización In Vitro; Rol de la Enfermera; Técnicas Reproductivas Asistidas.

INTRODUCTION

The family, throughout the entire historical process of civilization, is constituted from a core in which (currently) new family arrangements have been configured. However, when it comes to the formation of a family, there is a desire for potential parents to develop the experience of having children, including the gestation process. The formation of a family is a common project in society and may be one of the most important stages in the life cycle for some individuals. In this sense, the accomplishment of this desire can be interrupted by the occurrence of infertility, which can reduce the chances of pregnancy. In this and other circumstances, such as in Homoaffective relationships, the use of Assisted Reproduction Technologies (ART) can make the project of having children viable[1].

Infertility is common and the World Health Organization (WHO) estimates that there are between 4 and 7 million infertile women in Brazil[2]. The number of infertile individuals (men and women) has been increasing in recent years, reaching about 30% of couples in childbearing age[3]. In this way, an individual (man or woman) is considered infertile when he or she has alterations in the reproductive system that reduce or prevent their ability to have children. By definition, infertility refers to the inability of a couple to conceive a pregnancy within 12 months of regular sexual activity without the use of contraception[4,5]. One way to get around infertility is through Assisted Reproductive Technologies (ART). ART is understood to be a set of methods whose objective is to try to facilitate pregnancy in women with difficulties to become pregnant and includes artificial insemination, in vitro fertilization (IVF), embryo transfer, intracytoplasmic sperm injection (ICSI), tubal gamete transfer and frozen embryo transfer[4]. Depending on the ART approach employed, the chances of getting pregnant with each fertilization cycle can reach up to 35%. However, over 40 years, pregnancy rates with ART have declined to (at most) 15% per attempt[6]. In general terms, ART techniques make a dream come true for individuals[2].

Infertility is a multifaceted problem that has important repercussions in the social and psychological spheres of affected couples, causing physical and emotional suffering[5]. Even using modern techniques, the feasibility of the parental project may not occur, requiring a multidisciplinary team to be prepared to support infertile individuals (or couples). Providing care and preparing for treatments related to infertility is the responsibility of all members of the human reproduction team, offering information, clarifying doubts and offering support for these people to find the best way to deal with this situation[4].

In this scenario, nurses play a fundamental role in relation to ART, specifically in preparing couples or individuals. With this, people can advance in infertility care, with adequate information and follow-up. In the case of ART, the specificity of nursing care resides in helping individuals to understand the anatomy and physiology of the male and female reproductive system, informing about possible infertility, offering emotional support, understanding cultural issues, weighing family pressures and helping to direct personal expectations regarding the diagnosis and the trajectory involved in care[3].

The role of the nurse in ART, from the perspective of the care subjectivity, requires a technical-scientific basis. Nurses need essential attributes to be qualified in this specific area of sexual and reproductive health. Working in ART can involve new and challenging nursing care. This requires training in daily work and constant search for updating and knowledge based on scientific evidence. The foundation necessary for nurses to act in ART can emerge as a means to overcome a possible academic lack of protocol and formal information in nursing education institutions[6].

The sources of formal knowledge available to nursing in the context of ART are limited. This lack can be evidenced through a careful and comprehensive investigation in the literature. There is a shortage of publications that address the intersection between fertility and ART within the scope of nursing professionals[3,6]. Thus, the following research question arises: *What is the role of nurses in Assisted Reproduction and fertility, considering technical aspects and contributions to professional training?*

Therefore, the objective of the study was to map the scientific production on the contributions of nursing professionals in relation to ART. The main contribution of this work is directed (then) to the identification of how nursing has been acting in ART and fertility from the specialized scientific production. Thus, it is possible to initiate an in-depth discussion of nurses in ART and fertility from this specialized and consolidated reference. The absence of a consolidated literature base on the application of ART in nursing practice further emphasizes the importance of this research for the area.

METHODOLOGY

Design, period and place of study

This is an integrative literature review (ILR) on fertility and assisted reproduction (ART). ILRs are research methods employed to provide the best knowledge produced about a particular research problem. Thus, ILR aims to synthesize results obtained in research on a theme or issue, in a systematic, orderly and comprehensive way[7].

Study protocol

The review part involved the development of 5 steps:

i. Identification of the research objective/question;

ii. Literature search;

iii. Data extraction;

iv. Grouping and summarizing; and

v. Data presentation.

The entire research protocol follows the Joanna Briggs Institute (JBI) recommendations, being structured according to the Systematic Reviews of Text and Opinion. The text and opinion module is intended to assist reviewers to evaluate, extract and analyze and synthesize data from textual and evidence-based expert opinions[9]. The presentation and organization of the development of this work followed the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[10].

For the development of the first stage, the strategy of population, intervention and context (PICO) was used in order to answer the research question. For the definition of eligibility criteria for works from the literature. Specifically:

- **Population** includes nurses who work in ART and on issues related to infertility;
- **Intervention** includes the necessary nursing knowledge to work technically in ART and infertility; and
- **Context** includes scenario of performance of nurses in ART and infertility.

From the research question, sub-questions were derived to guide the literature analysis (Chart 1↗).

For the searches (stage ii) a strategy was developed under the analysis of two health professionals: a specialist and a master's student; and, a doctor. The evaluations were carried out independently. In cases of disagreement, a third party (also a doctor) to raise disagreements and reduce the risk of bias. In this work, we considered only works published between 2010 and 2021. This time interval used for the search strategy is based on the fact that ART and infertility can be a subject little discussed in the nursing literature.

To create the search string (as comprehensive as possible), the available descriptors related to the research question were used in the following controlled vocabularies:

a) Medical Subject Headings (MeSH): "Reproductive Techniques", "Assisted (ART)", "Infertility, "Nursing", "In Vitro Fertilization" and "Profile of Nurses' Skills";

b) Descriptors in Health Sciences (DeCS): "Assisted Reproduction Techniques", Infertility", "Nursing", "In Vitro Fertilization" and "Profile of Nurses' Skills".

The terms were applied, in a similar way, in all databases respecting the following logic ("assisted reproduction techniques" OR "in vitro fertilization" OR "infertility") AND ("nursing" OR "nurses competency profile").

Data were collected in February 2022. Searches were carried out in the following databases: Medline US National Library of Medicine National Institutes of Health (PubMed), Cumulative Index to Nursing and Allied-Health Literature (CINAHL), Web of Science, Latin American and Caribbean Literature in Health Sciences (LILACS) and Scopus. The bases included in this work refer to the main sources of research, including the number of indexed articles for health.

In step iii, data were extracted after applying the inclusion and exclusion criteria. Specifically, original research articles published in their entirety freely and free of charge in journals in the selected databases, in Portuguese, English and Spanish, were included.

Published articles that did not offer a research basis on the importance of nursing in ART, duplicate articles, editorials, review articles, letters to the editor and gray literature were excluded from the research. Levels of evidence were disregarded.

The reviewers used the Textual data extraction form for text and opinion publications, for the textual data extraction process. This tool aims to facilitate the recovery of important data that can be identified from many articles and summarized in a single document[9].

For the grouping and summary (step iv) the selected studies were subdivided into three major topics related to the research sub-questions (Chart 1↗). For data presentation (step v), the articles were tabulated according to authors, title, country/year, analyzed topic, objective, conclusion and main findings.

Because it is a ILR, this study was not submitted to the Research Ethics Committee (CEP). This work did not involve research on human beings, but it respects the copyright of the studies selected in this study.

RESULTS

Initially, an analysis of titles and abstracts was carried out to identify articles that fit the proposed theme. A total of 852 articles were identified. Then, the inclusion and exclusion criteria were applied, resulting in a sample of 32 articles, which were read in full. After reading, 21 articles that did not respond to the research question of the review were excluded. Then, for final analysis and discussion, ten articles were selected. The stratification of data referring to the number of articles selected and the year of publication is shown in Figure 1↗. Figure 2↗ illustrates the search and analysis strategy using the PRISMA Diagram[11].

In general terms, the main justification for removing articles from the sample lies in the fact that the vast majority of articles addressed aspects of medical conduct. Specifically, they dealt with medical processes of infertility and ART, not addressing the issues of interest to the study, e.g. nursing.

In evaluating the methodological quality of the selected articles, the GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) approach was used. GRADE provides a systematic method for assessing the strength or reliability of evidence. The quality of evidence is categorized into four different levels: very low, low, moderate or high. This classification provides a clear framework for understanding the reliability of available documents[12].

The final sample is available in Chart 2↗. The chart includes the main elements of the review, detailing authors, country of publication, title, population, level of evidence, phenomena of interest and context for the specific review, conclusion and main findings[9].

DISCUSSION

In this section, the main considerations on the literature evaluated are presented.

Nurse's role in ART and fertility

The integral role of the ART nurse correlates with acting in ART and fertility treatment settings, patient education, healthcare environment with multiple responsibilities. It is noteworthy that it is up to the professional to develop knowledge about protocols for the treatment of ART; drug protocols for ovarian induction; the use of these drugs and their adverse effects; understanding about embryogenesis; physiology and anatomy of the reproductive system; counseling skills; and health education. As in other spheres, the role of nursing is fundamental for effective health care and care in ART[13].

A study carried out with 16 nurses, working in ART and fertility services in Rio de Janeiro (RJ), points out that it should be part of the nurse's competences to welcome and monitor the physical and psychological evolution of the couple/individual, to care, humanize, advise, guide, apply protocol medications, check their effects, and make himself/herself available, promoting the quality of health care. These skills illustrate the practical dimension of nurses' work in ART[6].

The practical dimension of nursing care in ART is based on reproductive technologies. This requires technical and specific knowledge of all ART procedures, individualizing each case, representing themselves as technical professionals, but also humanized and sensitive to the stories of couples/individuals[6].

From another perspective, patients' perception of nurses' roles during their fertility treatment was that nurses have an important role in infertility treatment and performing activities such as: monitoring vital signs, administering oral medications and injections, physical examinations, counseling, preparation for procedures, clarifying medical instructions, post ART procedures, and health education[14].

In terms of health education and promotion, nurses need to consider ways to encourage patients in reproductive age to benefit from improved information about infertility risks and preservation options in cases of cancer treatment, to support their reproductive needs. These professionals often experienced a perception of lack of knowledge, requiring training or guidance to participate in these discussions, guiding patients to fertility preservation options before starting cancer treatment, which in some situations can cause permanent infertility to the individual[15].

Oncofertility is an interdisciplinary field of recent development. This area seeks to merge knowledge in oncology and reproductive medicine (with the contribution of ART techniques) for the development of strategies to preserve gonadal function and offer the possibility of biological reproduction to survivors of neoplasms[16].

In a study that aimed to identify what were the guidelines on fertility preservation and reproductive planning in women of reproductive age, with cancer and during their chemotherapy treatment, it showed that 100% of the participants pointed out the importance of receiving such information before starting therapy oncology. As for the information received about the importance of reproductive planning, 77.6% of the participants reported that they were guided on the subject, 16.3% of the participants indicated the desire to become pregnant after the end of the chemotherapy treatment. However, only 6.1% received counseling to preserve fertility[17].

Ethical issues are important in the scope of nurses working in ART and fertility. Some points are addressed in the study carried out in Rio de Janeiro, which organized them into (i) institutional, (ii) professional and (iii) individual issues related to the reproductive limits involved in ART. In (i) differentiated accessibility for patients, as it is a high-cost service, with scarce supply to the most vulnerable and low-income population, leaving reproductive health for conception purposes aimed at the population that has financial conditions. Another issue refers to the involvement of ART care with the private health system, which imposes profitable marketing rules, running the risk of the ethical issues of assisted reproduction being left in the background[6].

Yet the professional ethical aspects (ii) cover dealing with intimate issues of the couple/individual, which goes through a complex process, involving dreams, desires and expectations, in addition to high-cost monetary issues. In (iii) they involve individual beliefs and values in the daily life experienced by professionals in a new work area enriched by dilemmas, mainly ethical ones. In this case, there is a requirement for the positioning and attitude of these professionals[6].

Qualifications/technical skills of nurses in ART and fertility

Some studies describe that the characteristics of nurses who work in ART are inherent to a qualified professional to work in any field of nursing (general training). However, they recognize some specific attributes for nurses to be qualified in this specific area of sexual and reproductive health, such as: knowledge in ART technologies, ethics for dealing with issues that are so intimate for the couple/individual and attentive listening with user embracement. These characteristics constitute fundamental skills for nurses to work in ART and fertility[6,18].

In 2012, researchers in Australia described the main aspects in the context of specific knowledge and skills for nursing practice in assisted reproduction[11]: anatomy, physiology and endocrinology, associated with female and male reproduction, for an effective practice within ART; treatment protocols and policies for appropriate daily practice and satisfactory management of the ART patient's treatment cycle and procedures performed; patient education, to provide adequate and comprehensive knowledge of aspects of infertility treatment and ART to patients accessing services; and counseling support/strategies, to support patients during their treatment. However, the same authors mention that for the practice of counseling by professionals, one must have a deep knowledge of all aspects of treatment in ART[13].

Regarding drug treatment protocols for controlled ovarian stimulation, a study described that by offering the nursing consultation, especially to women for guidance on self-administration of drugs, it was possible to identify that the nurse needs to have knowledge about the different drug presentations. Pharmaceuticals stand out, such as: pens pre-filled with medication; injections manually loaded with syringes, requiring different reconstitution; pre-filled syringes with diluents plus lyophilized powder; and, pre-filled syringe with no need for reconstitution. The administration of these medications can generate doubts and anxiety in patients when self-administered at home[18].

Furthermore, it was possible to verify that carrying out the nursing consultation before starting the ovarian stimulation protocols led to a reduction in the number of calls to the clinic during the treatment of ART and an improvement in the satisfaction of these patients. In these consultations, the nurse addressed questions related to the stages of ovarian induction, presentation of the medications to be used, demonstration of use, hand hygiene and general instructions for the preoperative period of oocyte retrieval[18].

In a study carried out with the participation of nurses from ART services, it was verified that even though the nurse is not the one who performs the clinical and medication indications, nor manipulates the laboratory technologies, he is the one who welcomes and monitors the physical and psychological evolution of the couple/ individual. He still cares, humanizes, advises, explains, applies medications, checks their effects and makes himself available, promoting the quality of health care[6].

The nurse's role goes far beyond care, but also to identify the feelings that emerge from couples. With this, the nurse can act in order to prepare them for the conquest (or not) of pregnancy and motherhood, having a significant role in the health teams for the success of the treatment[13].

This may be due to the fact that ART and fertility treatments can lead individuals to emotional distress, which includes anxiety, depression, reduced libido in both partners, premature ejaculation and transient impotence, tension between men, among others. These factors can trigger feelings of failure and frustration. In this way, the presence of the nurse throughout the process can reduce symptoms of anxiety, through educational guidance, clarification of medical instructions, support and welcoming[14].

Education programs for ART and fertility training

One of the studies evaluated the effectiveness of a structured teaching program on recent trends in infertility management for nurses in a hospital in India. Sixty nurses were selected using the intentional sampling method. Participants were invited to respond to a structured questionnaire as a diagnostic assessment of prior knowledge. Then, the teaching program was applied and (with an interval of one week) they answered the questionnaire as an evaluative activity. For this evaluation (before and after) of the teaching program, the same tool used for the pre-test was applied. This evaluation aimed to analyze the effectiveness of a teaching program[19].

The results revealed a significant increase in the knowledge score of nurses undergoing qualification. The gain over individuals who had learned in the structured teaching program was expressive (39.3%), going from 45.9% to 85.2% in correct answers in the questionnaires. However, the study does not methodologically describe the characteristics of the research subjects, area of expertise or previous experience with infertility and/or ART, nor does it detail the teaching method used in the program and its workload[19].

In a study conducted in Iran in 2017, infertile women who were candidates for ovarian puncture were evaluated at an Infertility Clinic. The participants took part in an education program with group guidance, carried out by nurses, lasting from 30 to 60 minutes. The instructions addressed the type and duration of surgery, postoperative care, including diet, medication consumption, quality and quantity of rest after surgery and postoperative period. A questionnaire was applied before and after the group orientations to assess the patients' anxiety level in the pre-surgery period[20].

The results showed that the education carried out by nurses in the preoperative guidelines for patients undergoing ovarian puncture was effective, reducing the level of anxiety. The results of this study show the possible effects of health education carried out by nurses in the preoperative period of ovarian puncture[20].

From this same perspective, research has shown that multidisciplinary teams composed of nurses have a positive effect on patients' quality of life. This study aimed to determine the influence of an education and care program on the quality of life of female patients undergoing fertility treatment with ART technology. Participants completed the Fertility Quality of Life Tool (FertiQoL) and Short Form Health Survey questionnaires, considered as a tool to understand the impact of fertility problems and their treatment on the patient's quality of life[21].

In this study, the education and care program was carried out by physicians and nurses who worked in ART and who had been trained. The educational program consisted of follow-up sessions held at the beginning of therapy, after three and six months of infertility treatment, lasting 30-60 minutes. The researchers created three materials to support the program: a booklet on tests and treatments; a booklet that contained advice on psychological stress that patients may experience during treatment. The third material was the inclusion of a new approach to encourage communication between patients and physicians, allowing patients and physicians to record test results, methods of treatment or physical condition and questions[21].

At the end of this work, it was possible to verify that the application of the program improved the nurses' practices, as it deepened their understanding and improved the relationship with patients through repeated education and care sessions. In addition, it can improve the patients' perception of satisfaction. Study limitations were difficulties in recruiting patients, ensuring time for each session, and adjusting the patient's appointment date and the program nurse's working hours[21].

An education program conducted in South Korea, aimed at nurses working with infertility and ART, used the guidelines on routine psychosocial care in infertility from the German Society for Fertility Counseling. The educational program had the nature of complementary training, lasting eight hours, focused on infertility counseling. This program aimed to promote an integrated view of the impacts of infertility on patients dealing with this treatment[22].

The contents addressed in the program were “understanding counseling and the attitude of infertility as a counselor”, “social and psychological understanding of patients facing infertility”, “advising techniques and dealing with difficult patient behavior” and “analysis of clinical guidelines for counseling of national and international infertility”. The program was developed through practical education and counseling, educational booklets and application of activities, diagnosis (before) and evaluation (after) the course. The study pointed out that the education program improved and improved the counseling skills of the participating nurses[21].

Limitations of the study

The limitations of this ILR are related to the sample of articles used. Only articles available online and free of charge were included, which may have resulted in the non-inclusion of some relevant studies related to the theme. Other limitations may result from the unintentional exclusion of works related to the theme, but which used keywords different from those standardized in MeSH or DeCS. In addition, there is a limitation regarding the selection bias of the articles due to the interpretation of the authors, even with the use of an instrument to assist in the analysis process.

During the course of this research, significant difficulty was also found in locating published articles on the specific topic aimed at nurses. It is important to emphasize the importance of carrying out future studies that can systematize knowledge, addressing the role of nurses in ART and infertility in a more comprehensive way.

Contributions to Nursing

Contribution to the identification of problems and needs related to the role of nurses in ART and infertility, helping in a possible increase in scientific production on the subject. There are still few works that highlight the role and contribution of nurses to act in care related to fertility and ART. There are relatively few studies addressing the role of nurses in the management of infertility and some indications about educational/instructional mechanisms can help define teaching-learning strategies towards better qualification for care.

FINAL CONSIDERATIONS

This ILR highlights the lack of protocol and formal information on ART in nursing education institutions, the scarce supply of academic tools, in addition to the scarcity of publications and studies addressing the skills of nurses in the management of infertility. We were able to verify that the role of nurses in ART is fundamental and covers several areas of activity.

Nurses play a crucial role in providing comprehensive care for ART and fertility, specifically in terms of patient education, physical and psychological care, drug administration, guidance on procedures and promotion of quality health care. The practical dimension of nursing care in ART is supported by technical knowledge of reproductive technologies and sensitivity to the needs and stories of couples/individuals. Nurses can also help reduce patients' emotional suffering by providing support, welcoming, clarifying medical instructions and offering educational guidance.

Specifically in terms of training and qualification of nurses to work in ART and infertility, education programs can contribute to the improvement of their knowledge and specific skills. However, the existing literature is scarce. Therefore, teaching instruments, such as educational booklets, digital books, educational portals and short-term online courses can come to equip nurses in the search for quality care in fertility and ART.

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EN: Coordenação do estudo, desenho do estudo, recolha, armazenamento e análise de dados, revisão e discussão dos resultados.
AP: Desenho do estudo, análise de dados, revisão e discussão dos resultados.
FS: Desenho do estudo, análise de dados, revisão e discussão dos resultados.
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Chart 1 – Sub-questions created to guide the analysis based on the research question.

Question 1	What is the nurse's role in ART and fertility?
Question 2	What are the nurse's qualifications/technical skills in ART and fertility?
Question 3	What are the contributions of nursing in educational terms to training in ART and fertility?

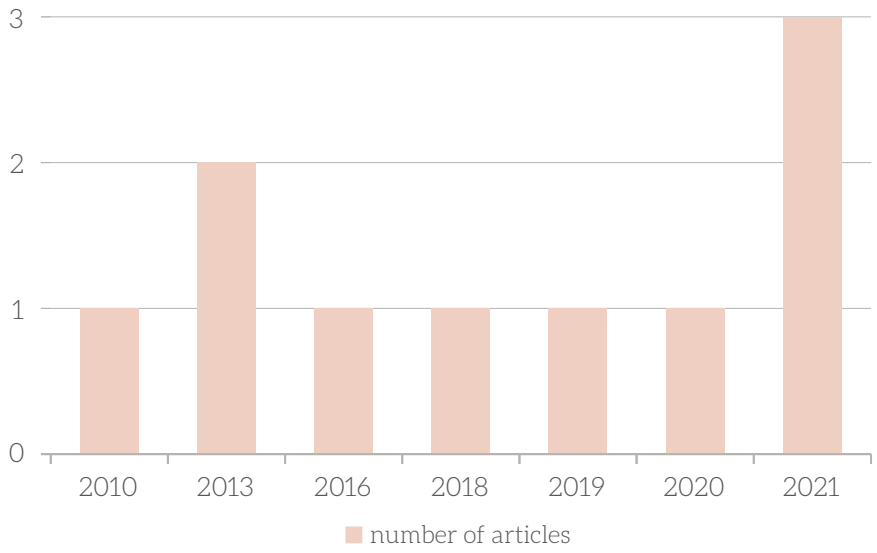


Figure 1 – Stratification chart of the number of articles by year of publication.

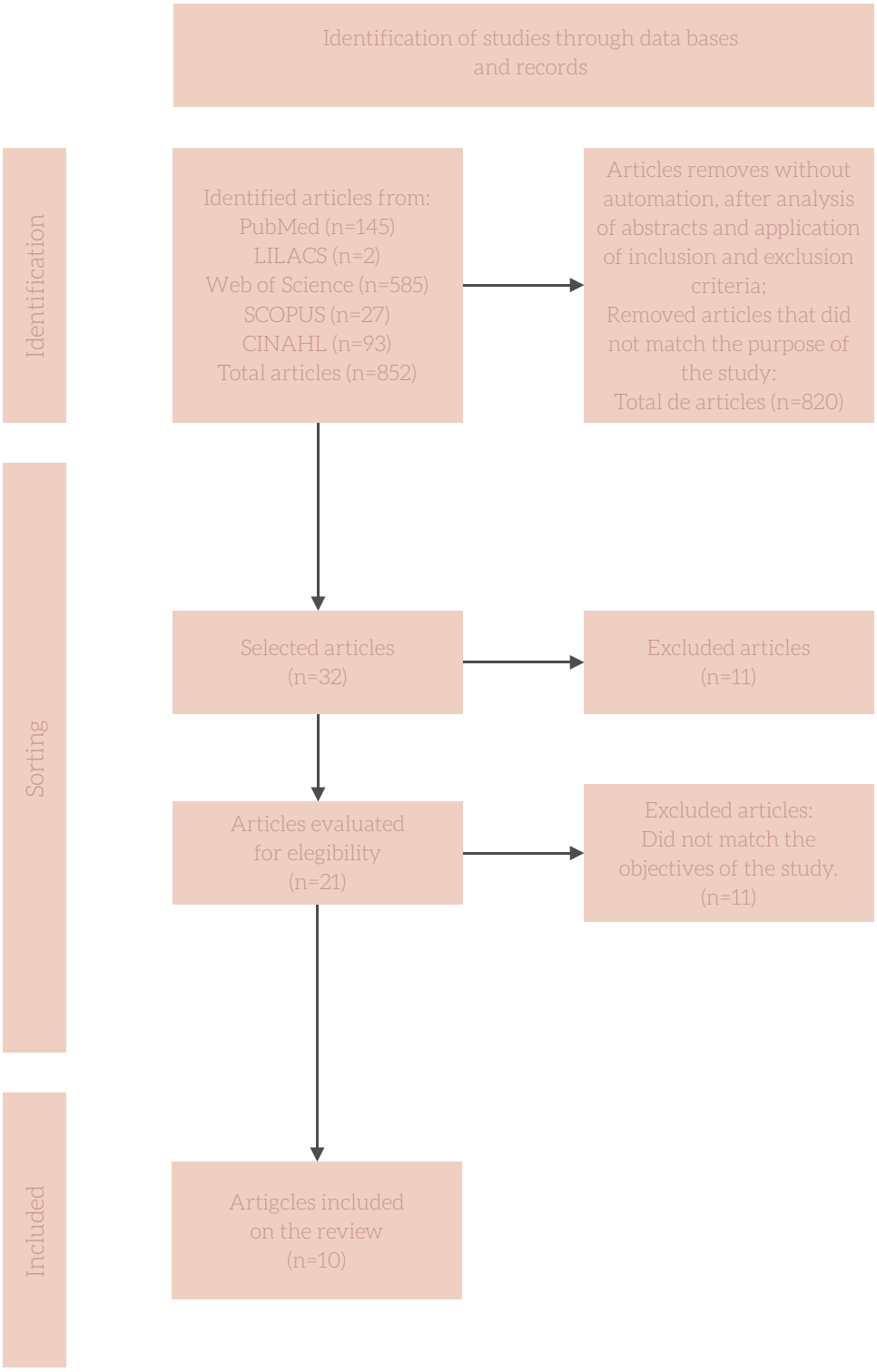


Figure 2 – PRISMA diagram adapted by the authors[10].

Chart 2 – Characterization of review elements, detailing authors, title, country and year of publication, topics analyzed, type of study, level of evidence, objectives, conclusion, and main findings.

Authors	Title	Country/ Year	Topics analyzed in the discussion	Type of study	Level of Evidence	Objective of the Study	Conclusion	Main findings
Omu F, Omu A.	Emotional reaction to diagnosis of infertility in Kuwait and successful clients' perception of nurses' role during treatment.	Kuwait 2010	Technical qualifications/ competences of nurses in ART and fertility. Nurse's role in ART and fertility.	Quantitative and qualitative study.	Moderated.	To explore the feelings regarding the diagnosis of infertility and the perception of the nurse's role during the infertility treatment period.	Nursing courses in Nursing Colleges should explore the possibility of developing fertility programs to help these nurses develop more knowledge and skills in infertility nursing.	Nurses working in fertility units are not trained to provide counseling. There are few studies addressing the role of nurses in the management of infertility.
Applegarth J, Dwyer T, Moxham L, Happell B.	Identifying and acquiring the contextual skills and knowledge for nursing practice in assisted repro-ductive technology: a grounded theory study.	Australia 2013	Technical qualifications/ competences of nurses in ART and fertility. Nurse's role in ART and fertility.	Qualitative study.	Very low.	Identify the contextual knowledge and skills needed to practice nursing in assisted reproductive technology (ART).	This research highlighted the integral role that ART nurses have within IVF and as the central person coordinating patient care cycles. The focus of professional development needed to be contextualized for the practice of ART nursing.	Knowledge required to practice ART as follows: anatomy, physiology and endocrinology; treatment protocols; patient education procedures and support/counseling strategies.

Source: Textual data extraction form for text and opinion publications[9], adapted by the authors.

Chart 2 – Characterization of review elements, detailing authors, title, country and year of publication, topics analyzed, type of study, level of evidence, objectives, conclusion, and main findings.↔↖

Authors	Title	Country/ Year	Topics analyzed in the discussion	Type of study	Level of Evidence	Objective of the Study	Conclusion	Main findings
Costa ALSR, Souza MCB, Mancebo ACA *et al.*	Atuação da enfermeira em Medicina Reprodutiva: melhorando o desempenho da paciente na auto--aplicação das medicações.	Brazil 2013	Technical qualifications/ competences of nurses in ART and fertility.	Exploratory evaluation.	Very low.	Identify how nurses can assist patients with their daily fertility treatment injections through the nursing consultation.	Our article demonstrates that nurses can be more involved in ART treatments. Additional skills can add experience to improve patient's performance in self-medication.	Carrying out nursing consultations reduced calls with doubts regarding the medication being used.
Fernandes ESB, Duarte VF, Oliveira LC *et al.*	Atuação dos enfermeiros das Unidades Básicas de Saúde diante da infertilidade masculina.	Brazil 2016	Technical qualifications/ competences of nurses in ART and fertility.	Descriptive and exploratory study, with a qualitative approach.	Low.	Analyze the role of nurses in Basic Health Units in face of male infertility.	The topic of male infertility is not usually discussed by FHS nurses, this study showed a lack of knowledge about infertility, causes and existing treatments.	It was found that male infertility is unknown not only as a topic but there is also a lack of technical qualification.

Source: Textual data extraction form for text and opinion publications[9], adapted by the authors.

Chart 2 – Characterization of review elements, detailing authors, title, country and year of publication, topics analyzed, type of study, level of evidence, objectives, conclusion, and main findings.↔↖

Authors	Title	Country/ Year	Topics analyzed in the discussion	Type of study	Level of Evidence	Objective of the Study	Conclusion	Main findings
Wright E, Norton W, Geary M.	Nurses' experiences of undertaking fertility-related discussions with teenagers and young adults with cancer: An interpretive phenomenological analysis.	England 2018	Nurse's role in ART and fertility.	Qualitative Interpretative Phenomeno-logical Analysis.	Low.	Explore and interpret nurses' experiences, feelings and associated meanings related to carrying out fertility-related discussions with adolescents and young adults with cancer. Understand the factors that facilitate or hinder such discussions, in order to progress in clinical practice.	Continuing education for nurses can ensure that young adult cancer patients are cared for. Nurses need to consider ways to ensure that female patients benefit from improved information about infertility risks and preservation options to support their reproductive needs.	Nurses experienced a perceived lack of knowledge, resulting in avoidance of raising fertility issues. Nurses expressed a need for more knowledge and education to participate in discussions.

Source: Textual data extraction form for text and opinion publications[9], adapted by the authors.

Quadro 2 – Characterization of review elements, detailing authors, title, country and year of publication, topics analyzed, type of study, level of evidence, objectives, conclusion, and main findings.↔↖

Authors	Title	Country/ Year	Topics analyzed in the discussion	Type of study	Level of Evidence	Objective of the Study	Conclusion	Main findings
Solanki R.	A study to assess the effectiveness of structured teaching programme on knowledge regarding recent trends in infertility management among staff nurses working in SC Hospital, Hassan, Karnataka.	India 2019	Education programs for ART and fertility training.	Pre-experimental study.	Low.	Assess the effectiveness of the structured teaching program on knowledge about recent trends in infertility management among the nursing staff working in the hospital.	Application pre- and post-test knowledge before and after structured teaching program on infertility. There was a significant increase of 39.3% in knowledge gain after the teaching program. The difference between pre- and post-test knowledge scores was highly significant.	The structured teaching program proved to be effective among nurses regarding trends in infertility management.

Source: Textual data extraction form for text and opinion publications[9], adapted by the authors.

Chart 2 – Characterization of review elements, detailing authors, title, country and year of publication, topics analyzed, type of study, level of evidence, objectives, conclusion, and main findings.

Authors	Title	Country/ Year	Topics analyzed in the discussion	Type of study	Level of Evidence	Objective of the Study	Conclusion	Main findings
Queiroz ABA, Mohamed RPS, Moura MAV *et al.*	Trabalho do enfermeiro em reprodução humana assistida: entre tecnologia e humanização.	Brazil 2020	Technical qualifications/ competences of nurses in ART and fertility. Nurse's role in ART and fertility.	Exploratory with a qualitative and descriptive approach.	Low.	Understand how and what this social group thinks about issues related to AHR, Analyze the social representations of nurses who work with AHR about their work with reproductive biotechnologies.	Working in ART involves new nursing care, the nurses in their representation considered themselves pioneers in this type of assistance in sexual and reproductive health, trained in daily work and in the constant search for updated knowledge and based on scientific evidence, as a means of fill the academic lack of information.	Participants point out that all the means they use to acquire information come from a personal/ individual search. The absence of a reference for nurses who work with AHR becomes unstructured.

Source: Textual data extraction form for text and opinion publications[9], adapted by the authors.

Chart 2 – Characterization of review elements, detailing authors, title, country and year of publication, topics analyzed, type of study, level of evidence, objectives, conclusion, and main findings.

Authors	Title	Country/ Year	Topics analyzed in the discussion	Type of study	Level of Evidence	Objective of the Study	Conclusion	Main findings
Farnia F, Aflatoonian A, Kalantari A.	Comparing the effects of nursing versus peer-based education methods on the preoperative anxiety in infertile women: An RCT.	Iran 2021	Education programs for ART and fertility training.	Randomized clinical trial.	Moderated.	To examine and compare the effect of preoperative nurse and peer educational approaches on women candidates for ovarian puncture surgery.	Results showed that education carried out by nurses was more effective than that carried out by peers. And both groups the level of anxiety was lower than the control group.	Highlights the importance of including preoperative education for patients. The results indicate the effect of nursing in this type of action in women candidates for ovarian puncture.
Park J, Shin N.	Effect of an Infertility Counseling Education Program on Education Satisfaction and Counseling Competency of Nurses.	South Korea 2021	Education programs for ART and fertility training.	Experimental study.	Moderated.	Develop an infertility education and counseling program to improve the counseling competence of nurses caring for patients facing infertility and evaluate the effect of this program.	The results of this study can be used to develop an intervention program to provide counseling by infertility nurses to patients facing infertility, based on the effectiveness of the tests in this study.	Nurses' counseling competence was improved through the infertility counseling education program.

Source: Textual data extraction form for text and opinion publications[9], adapted by the authors.

Chart 2 – Characterization of review elements, detailing authors, title, country and year of publication, topics analyzed, type of study, level of evidence, objectives, conclusion, and main findings.

Authors	Title	Country/ Year	Topics analyzed in the discussion	Type of study	Level of Evidence	Objective of the Study	Conclusion	Main findings
Mori A, Nishii O, Takai Y *et al.*	Influence of a patient education and care program on women undergoing non-assisted reproductive technology fertility treatment.	Japan 2021	Education programs for ART and fertility training.	Prospective study.	Moderated.	Clarify the influence of an education and care program for female patients undergoing infertility treatment without ART.	Patient education and care program provided by reproductive fertility specialists or fertility nurses improved patient satisfaction.	The program improved nurses' practices, improved their relationship with the patient through repeated education and care sessions.

Source: Textual data extraction form for text and opinion publications[9], adapted by the authors.