

## Contributions of nurses in the process of adherence to tuberculosis treatment

*Contribuições dos enfermeiros no processo de adesão ao tratamento da tuberculose*

*Contribuciones de los enfermeros en el proceso de adhesión al tratamiento de la tuberculosis*

**Rayrla Cristina de Abreu Temoteo<sup>1</sup>**

ORCID: 0000-0003-1980-7819

**Jéssica Aslan Santos da Silva<sup>2</sup>**

ORCID: 0000-0003-1506-6881

**Sylvia Silva de Oliveira<sup>2</sup>**

ORCID: 0000-0001-7461-6439

**José Renato Paulino de Sales<sup>2</sup>**

ORCID: 0000-0002-4190-2639

**Marcelo Costa Fernandes<sup>1</sup>**

ORCID: 0000-0003-1626-3043

**Jovanka Bittencourt Leite de Carvalho<sup>2</sup>**

ORCID: 0000-0002-0785-3423

### Abstract

**Objective:** To identify the contributions of nurses in the process of adherence to tuberculosis treatment. **Methods:** Integrative review in the Cumulative Index to Nursing and Allied Health Literature, Medline complete Ebsco, PubMed Central, Science Direct, Scopus and Web of Science databases using the descriptors Patient Compliance, Medication adherence, Treatment adherence and compliance, Tuberculosis and Nurse's Role. **Results:** From the articles that composed the final sample, the contributions of nurses in the adherence process that emerged consisted of counseling, home visits, use of technologies and programs such as Directly Observed Treatment, video supervision and social support. **Conclusion:** Nurses are professionals who contribute to the implementation of these methods. The use of wireless technology added to electronic methods is promising and can mean a great advance, since direct supervision has not been economically viable and feasible in several realities.

**Descriptors:** Tuberculosis; Patient cooperation; Adherence to medication; Nursing; Public health.

<sup>1</sup>Universidade Federal de Campina Grande. Cajazeiras, Paraíba, Brasil.

<sup>2</sup>Universidade Federal do Rio Grande do Norte. Programa de Pós-graduação em Enfermagem. Natal, Rio Grande do Norte, Brasil.

Corresponding author:  
Rayrla Cristina de Abreu Temoteo  
E-mail: [rayrlacz@hotmail.com](mailto:rayrlacz@hotmail.com)

### Whats is already known on this?

Adherence to treatment is considered a challenge in the face of unsuccessful attempts to monitor medication intake through direct observation interspersed with dose self-administration.

### What this study adds?

Lists strategies and technologies that can be substitutive or complementary to the direct observation of the medication, presenting from light technologies to hard technologies with prospects of adapting to various realities.



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### Resumo

**Objetivo:** Identificar as contribuições de enfermeiros no processo de adesão ao tratamento da tuberculose. **Métodos:** Revisão integrativa nas bases de dados Cumulative Index to Nursing and Allied Health Literature, Medline complete Ebsco, PubMed Central, Science Direct, Scopus e Web of Science a partir da utilização dos descritores Patient Compliance, Medication adherence, Treatment adherence and compliance, Tuberculosis e Nurse's Role. **Resultados:** A partir dos artigos que compuseram a amostra final, as contribuições de enfermeiros no processo de adesão que emergiram consistiram em aconselhamento, visitas domiciliares, uso de tecnologias e de programas, tais como o Tratamento Diretamente Observado, supervisão por vídeo e suporte social. **Conclusão:** O enfermeiro é um profissional que contribui na implementação desses métodos. O uso de tecnologia sem fio adicionada aos métodos eletrônicos é promissor e pode significar um grande avanço, uma vez que a supervisão direta não vem se mostrando viável e factível em diversas realidades.

**Descritores:** Tuberculose; Cooperação do Paciente; Adesão à Medicação; Enfermagem; Saúde Pública.

### Resumen

**Objetivo:** Identificar las contribuciones de los enfermeros en el proceso de adhesión al tratamiento de la tuberculosis. **Métodos:** Revisión integradora en las bases de datos Cumulative Index to Nursing and Allied Health Literature, Medline complete Ebsco, PubMed Central, Science Direct, Scopus y Web of Science utilizando los descriptores Patient Compliance, Medication adherence, Treatment adherence and compliance, Tuberculosis y Nurse's Role. **Resultados:** De los artículos que componían la muestra final, las contribuciones de los enfermeros en el proceso de adhesión que emergieron consistieron en consejería, visitas domiciliarias, uso de tecnologías y programas como Tratamiento Directamente Observado, video supervisión y apoyo social. **Conclusión:** El enfermero es un profesional que contribuye a la implementación de estos métodos. El uso de tecnología inalámbrica sumada a métodos electrónicos es prometedor y podría significar un gran avance, ya que la supervisión directa no ha demostrado ser viable y factible en varias realidades.

**Descritores:** Tuberculosis; Cooperación del paciente; Adherencia a la medicación; Enfermería; Salud pública.

## INTRODUCTION

Tuberculosis (TB) continues to be considered a public health problem, although commitment is made by priority countries for its control by the World Health Organization (WHO). This effort was reversed globally due to the COVID-19 pandemic, which reverberated, for the first time in a decade, in an increase in the number of TB deaths.<sup>(1)</sup> In 2020 fewer people were diagnosed and treated preventively and conventionally when compared to 2019. In Brazil, in turn, there has been an upward trend in incidence since 2016, which confers a strong concern on the part of the WHO.<sup>(1)</sup>

Therefore, it should be noted that adherence to treatment is an essential constituent, both for the cure and for the control of the global epidemiological scenario.<sup>(1)</sup> However, adherence does not consist only in therapeutic follow-up, but also in implementing the guidelines received by the professionals who assist,<sup>(2)</sup> which evidences the need to develop strategies that promote adherence with a focus on people with TB, but that can stimulate changes in habits in all those involved in the therapeutic process.<sup>(3)</sup>

In order to achieve these objectives, strategies are currently being developed to ensure that people with TB perform the treatment correctly, such as providing facilitators to assist in economic difficulties generated by the disease,<sup>(4)</sup> Directly Observed Treatment (DOT), which consists of daily observation of the intake of the medication, by the health professional or a qualified person, among others.<sup>(5)</sup>

In this regard, the Ministry of Health emphasizes that the professional nurses manage the service and perform planning, organizing and evaluating it, and therefore directly care for people with TB during their treatment.<sup>(5)</sup> Therefore, in the immediate context where adherence to TB treatment occurs, nurses in Primary Health Care (PHC) are presented, as a priority, supervising the taking of medications, following the attendance at monthly consultations and the performance of routine examinations by people with TB, as defining elements of adherence.

The promotion of this adherence, therefore, is limited to a reductionist view, when it is understood that the person undergoing treatment must submit to health professionals. However, nurses have the potential to contribute to greater articulation between actions necessary for the success of treatment, reducing weaknesses in its operation, using technologies that can favor praxis, and can subsidize new strategies appropriate to the reality of the services and each user.<sup>(6)</sup>

The performance of nurses is substantial, as it is characterized as a potential contribution to greater incentive to adhesion, improving its operationalization, including the potential of integration with other PHC professionals, an action necessary to fulfill the needs of people with TB in all services of the health care network, as well as for the planning of actions. That said, this study aims to identify the contributions of nurses in the process of adherence to tuberculosis treatment.

## METHODS

This is an integrative review, for which the following stages were considered: elaboration of the research question, search in the literature, categorization of studies, critical evaluation, interpretation of results and presentation of the integrative review.<sup>(7-8)</sup> Part of the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses were used to report the review.<sup>(9)</sup>

The research question was elaborated through the use of the PICO strategy, which allows the identification of keywords that help in locating relevant searches in the databases used. To this end, the question elaborated was: What are the contributions of nurses to assist/improve adherence to treatment of people with tuberculosis? The first element of the strategy (P) consists of the person with tuberculosis; the second (I), contributions of the nurse; the third (C), improvement of treatment adherence and the fourth element (O) adherence to treatment.

The search for the studies took place from March to May 2020, in the following databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medical Literature Analysis and Retrieval System Online (MEDLINE Complete EBSCO), National Library of Medicine (PUBMED), Science Direct (Elsevier), SCOPUS (Elsevier) and Web of Science (Main Collection - Thomson Reuters Scientific), accessed via the Capes Journals portal.

The descriptors were selected based on the PCO strategy. The Boolean operator OR was added between the synonyms and AND between the different terms, generating the search strategy: "Patient Compliance" OR "Medication adherence" OR "Treatment adherence and compliance" AND Tuberculosis AND "Nurse's Role". All terms were used in English to ensure a broader search in the literature.

The stages of selection of articles and analyses were developed independently by two reviewers, with no divergence between them. A controlled search was performed in each database using quotation marks as a search resource, in order to limit studies that presented the compound terms in the text.

The inclusion criteria established for the studies were: complete articles that addressed strategies used by nurses to encourage adherence to tuberculosis treatment; due to the wide discussion of the subject, as well as in order to identify more recent studies, the search period was limited from 2016 to 2020. Articles addressing strategies used by professionals other than nurses in adherence to tuberculosis treatment, traditional literature reviews, response letters and editorials, letters to the editor, abstracts, expert opinions, correspondence, reviews, book chapters, congress annals, theses and dissertations were excluded.

The selected articles were classified in relation to the level of evidence: level 1 - meta-analysis of multiple controlled studies; level 2 - individual study with experimental design; level 3 - study with quasi-experimental design, time series or case-control; level 4 - study with non-experimental design as correlational and qualitative descriptive research or case studies; level 5 - case report or data obtained in a systematic way, of verifiable quality or program evaluation data; level 6 - opinion of authorities with clinical competence, including interpretations of information not based on research.<sup>(10)</sup>

## RESULTS

The established search strategy resulted in a total of 144,074 titles. After applying the inclusion criteria as search limiters due to the high number of publications found, 11,955 of these were recovered.

Of these, 853 were excluded due to duplications and 11,102 due to the established criteria, as well as the title and/or abstract were read before definitively deleting it. Among them: secondary articles, medication pharmacology, TB/HIV association, adherence related to other diseases that did not answer or were not related to the question. Thus, 28 publications were selected for full reading. Next, 17 articles that were unrelated to the research question and 1 that was repeated in two databases were excluded, totaling 10 publications included in the review. Box 1 shows the crossings that were performed and the search results in each database.

**Box 1.** Crossings used and the results of each crossing in a box, by database consulted. Natal, Rio Grande do Norte, Brazil, 2020.

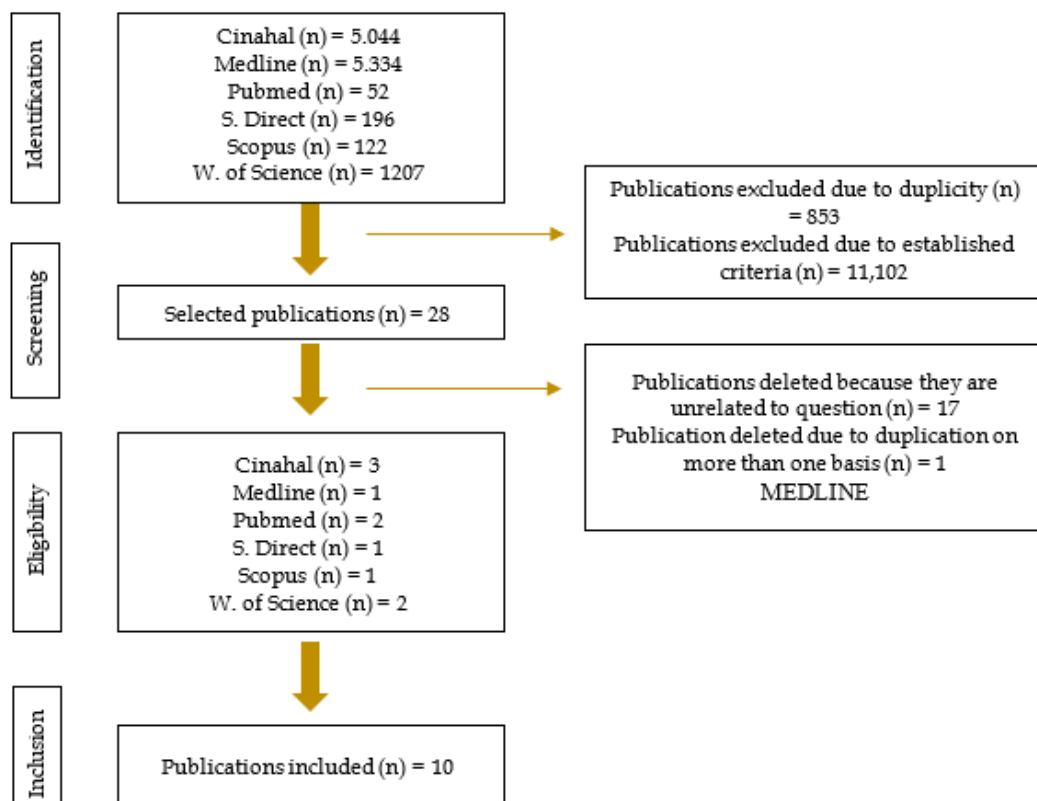
Crossings	Databases	N° of titles matches	N° of titles when delimiting limits and duplicates	N° of articles (in full)	N° of articles selected
("Patient Compliance" OR "Medication adherence" OR "Treatment adherence"	CINAHAL	48.488	5.044	9	3

compliance" AND Tuberculosis AND "Nurse's Role")					
"Patient Compliance" OR "Medication adherence" OR "Treatment adherence and compliance" AND Tuberculosis AND "Nurse's Role"	MEDLINE	86.188	5.334	6	1
(Patient Compliance OR Medication adherence OR Treatment adherence and compliance) AND Tuberculosis AND Nurse's Role	PUBMED PMC	109	52	4	2
Patient Compliance OR Medication adherence OR Treatment adherence and compliance) AND Tuberculosis AND Nurse's Role	SCIENCE DIRECT	2.865	196	3	1
Patient Compliance OR Medication adherence OR Treatment adherence and compliance AND Tuberculosis AND Nurse's Role	SCOPUS	623	122	4	1
Patient Compliance OR Medication adherence OR Treatment adherence and compliance AND Tuberculosis AND Nurse's Role	WEB OF SCIENCE	5.801	1.207	2	2

Source: Prepared by the authors (2020).

The contributions of nurses in the process of adherence to anti-tuberculosis treatment were identified in the articles descriptively or implicitly from the definitions listed. The selection process of the articles is described below, in figure 1, through the presentation of a selection flow diagram and identification of the studies according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).<sup>(10)</sup>

Figure 1. Synthesis of the data extraction process. Natal, Rio Grande do Norte, Brazil, 2020.



Source: Prepared by the authors (2020).

For the analysis and extraction of the data of the publications, a script was elaborated with the following variables: identification of the publication, journal, year, objectives and main results. For the critical evaluation of the studies, the level of evidence was identified.

The 10 articles included in this review<sup>(11-20)</sup> addressed strategies facilitating adherence to tuberculosis treatment carried out by nurses. Box 2 describes the intervention / strategy performed and the level of evidence of these studies.

**Box 2.** Summary of the characteristics of the studies that presented strategies to facilitate adherence to TB treatment. Natal, Rio Grande do Norte, Brazil, 2020.

Author (year)	Intervention / strategy carried out	Level of Evidence
DeWorsop D. et al. <sup>11</sup> / 2016	Daily video calls for visual confirmation of adherence to treatment (smartphone-based approach).	2
Jauhar M, et al. <sup>12</sup> / 2019	Counseling of self-management in self-efficacy in relation to health-seeking behavior.	3
Ilievska-Poposka B, et al. <sup>13</sup> / 2018	Home visits and delivery of hygiene and food products.	4
Ruru Y et al. <sup>14</sup> / 2018	Carrying out registrations, home visits and training of the patient and the person who will accompany the treatment.	4
AlSahafi A J et al. <sup>15</sup> / 2019	Direct supervision of members of a mobile outreach team for a group and traditional treatment for the control group.	4
Shiratani KN <sup>16</sup> / 2019	Home visits, telephone or email service, motivation and personalized support according to needs.	4
Charyeva Z et al. <sup>17</sup> / 2019	Social Support Program (support network with daily visits, active listening, continuous interpersonal communication, emotional, informative and instrumental support).	4
Park S et al. <sup>18</sup> / 2019	Medication Event Monitoring System for a group and traditional treatment for a control group.	4
Prabhu A et al. <sup>19</sup> / 2020	Treatment card as an adherence monitoring tool.	4
Park S, et al. <sup>20</sup> / 2020	Adherence to treatment as a key factor for improvements in Health-Related Quality of Life, implemented by nurses.	4

**Source:** Prepared by the authors (2020).

These studies were developed and published in the United States of America<sup>(11)</sup>, Indonesia<sup>(12,14)</sup>, Macedonia<sup>(13)</sup>, Saudi Arabia<sup>(15)</sup>, Japan<sup>(16)</sup>, Ukraine<sup>(17)</sup>, Morocco<sup>(18)</sup>, India<sup>(19)</sup> and Korea<sup>(20)</sup>, between the years 2016 and 2020.

It was demonstrated that the use of technologies such as software allows remote monitoring by nurses and consequently convenience for the person undergoing treatment, as well as reducing social stigma and non-adherence to treatment and reducing costs with travel to the treatment site.<sup>(11,18,19)</sup> Such technologies allow the confirmation of medication intake by trained staff, directly, through video calls<sup>(11)</sup> or indirectly, through telephone calls made by patients and confirmation by viewing the medication box, both at the time of medication intake, to this end, they confirm, measure and promote adherence to treatment.<sup>(18,19)</sup>

Regarding home visits, they were useful in contributing to the complementation of the therapeutic regimen without interruptions. The visits also provide the opportunity to identify obstacles in the effective implementation of treatment, such as side effects, complications and family problems, not having the sick person to move to the unit and expose himself to others as sick.<sup>(13-14)</sup> This strategy is still ideal for directly addressing the main difficulties that people undergoing treatment face in achieving adherence.<sup>(16-17)</sup>

Self-management counseling proved to be a form of nursing intervention focused on improving self-efficacy, especially with regard to health-seeking behavior by people with tuberculosis, through the provision of adequate and timely knowledge.<sup>(12)</sup>

As well as, the use of a short-lived Directly Observed Treatment outreach mobile service, led by nurses, promoted greater acceptability and reduction of default by people undergoing treatment for tuberculosis, through the availability of medications and guidance to users and family members respecting the most convenient time and place for them.<sup>(15)</sup>

In this sense, it was also evidenced that the quality of life related to mental health of people with tuberculosis worsens considerably during the treatment period. Therefore, encouraging their active

participation during the treatment process can help them deal with psychological issues generated by the disease, such as stress and depression, consequently with the treatment process.<sup>(20)</sup>

In addition, the level of evidence of the selected articles represented compliance with the criteria for classification of evidence categorized by the Agency for Healthcare Research and Quality of the United States of America when reaching levels between 2 and 4.<sup>(10)</sup> However, we highlight the need to advance the theme through studies with methodological designs that produce even more robust levels of evidence to better substantiate the performance of nurses in the process of adherence to anti-tuberculosis treatment.

## DISCUSSION

Based on the results presented here, it was observed the disclosure of strategies carried out by nurses that were configured as facilitators of adherence to treatment. It is clear, therefore, that a variety of approaches are available to support adherence, but a better understanding of the implementation and limitations of each is necessary. Some of these current approaches demonstrate a lack of feasibility, thus highlighting the need for alternative adherence monitoring systems that suit the specific needs of each health service.<sup>(21)</sup>

To this end, the treatment of people affected by TB has changed dramatically in the last decade; new technologies have been developed specifically for patients using TB medications. These include video-watching technologies, smart medication containers, and text-message-based solutions combined with medication-packing features, reminders, and other patient guides to mitigate confusing dosing considerations. These technologies are designed to be financially viable, to support the specifics of TB treatment, and also to support patients without routine access to a phone or the Internet. All of these approaches are designed to generate detailed dosing histories for each patient, which can be automatically delivered to health systems and providers to inform and enable differentiated care.<sup>(22)</sup>

As well, corroborating the findings of this study, in another systematic review and meta-analysis on interventions to improve adherence to tuberculosis treatment, a significant increase in cure rates was observed, of 18% with direct observation and 16% with patient education and counseling. In addition, the default rate decreased 49% with directly observed treatment, 26% with financial incentives and 13% with patient education and counseling.<sup>(23)</sup>

It can be seen that the treatment directly observed has been the standard of care for tuberculosis, which has been occurring since the early 1990s, but its applicability has proven inconvenient for patients and service providers in several countries, including Brazil. Thus, video-observation therapy was conditionally recommended by the World Health Organization as an alternative to direct observation. Treatment observation levels were improved with video observation, which was a more effective approach than direct supervision. Video observation is likely to be preferable to directly observed treatment for many patients in a wide range of settings, as it provides a more acceptable, effective, and less expensive option for monitoring daily and multiple doses.<sup>(24)</sup>

In the case of interventions led by nurses, two educational stages (written information in the native language and follow-up telephone calls) and two monitoring stages (Eidus-Hamilton test and follow-up questionnaire) were implemented exclusively by nurses; these interventions resulted in an increase in adherence to anti-tuberculosis treatment.<sup>(25)</sup> Thus, the simultaneous application of several educational and monitoring methods in the follow-up conducted by nurses improves the process of adherence to tuberculosis treatment. These results may also be applicable in other settings where tuberculosis is more prevalent and directly observed treatment strategies are not available or are not feasible.<sup>(25)</sup>

In addition, nursing professionals play crucial roles in the treatment of tuberculosis, so their performance is indispensable. Positive results are observed when nurses were present, through home visits during treatment. To this end, such visits proved important not only for the visualization of medication intake, but to make it possible to identify specific difficulties regarding treatment adherence and provide subsidies to remedy them, such as ways to reduce the main side effects resulting from medication therapy.<sup>(13-14,17)</sup>

In addition to the foregoing, difficulties regarding access to health services, lack of transportation, social stigma and discrimination<sup>(14)</sup> can be resolved, since home visits provide the sick people with the convenience of having assistance in a place of their preference, as well as the direct support of visiting health professionals.<sup>(17)</sup>

Among the roles played by Nursing during the treatment of tuberculosis, good health education related to issues involving the disease can contribute positively to the adherence process. Despite being

characterized as a standard procedure in nursing consultations, health education should be configured as a tool as important as taking medications. Among the various factors that negatively influence adherence to treatment by tuberculosis patients, there was a lack of knowledge, in general, about the disease, especially about the regime and duration of treatment, thus configuring a precarious health education provided to this clientele<sup>(14)</sup>, a reality that corroborates the importance of this stage of treatment.

In contrast to the aforementioned strategies, the use of hard technologies in primary care for health promotion, when properly implemented, tends to facilitate adherence to tuberculosis treatment, since it minimizes difficulties generated by the disease, which are considered as barriers to adherence.

In addition to the convenience generated by these methods, there were significant scientific results regarding the loss of follow-up especially in women who underwent the strategy, given that the culture of the country does not allow women to leave unaccompanied and, therefore, those who were diagnosed with tuberculosis were the majority in the rates of failure to adhere to treatment. The strategy of distance monitoring, allowed, therefore, to demonstrate the effectiveness of the use of hard technologies as a facilitator of adherence in a culture of inequality between the sexes.<sup>(18)</sup>

Achieving good interpersonal relationships involving people with tuberculosis and the professionals who assist them, especially nurses, proves to be an indispensable factor in order to improve adherence to treatment; however, despite the numerous benefits, there have been obstacles and challenges related to the management of this process, which prevents its implementation.

The limitations of this study focus on the possibility that some article was not identified in the determined search period. However, this research is important for nursing practice, as it provides the team with the necessary basis for monitoring throughout the treatment, listing technologies or tools described in the literature that nurses and their teams can use, paying attention to the issues of the reality of each region, either to plan the results to be achieved or as an intervention to contribute to the process of adherence to tuberculosis treatment.

## CONCLUSION

There are a variety of strategies available to encourage adherence to the treatment of tuberculosis, however, for it to occur effectively it is necessary the active participation of health professionals, development of contributory strategies, which simultaneously apply educational and monitoring methods. Therefore, nurses have been shown to be professionals who contribute to the implementation of these methods in different ways and their contributions lead to the improvement of this adherence process. Therefore, the use of wireless technology added to electronic methods is promising and can mean a great advance towards creating a real-time adherence evaluation system, since direct supervision has not been viable and feasible in several realities.

As a contribution to nursing science, the present study advances knowledge by identifying gaps in the literature that need to be filled with more robust studies on the development of nursing competencies in adherence to tuberculosis treatment as in the design of these competencies considering that nurses perform numerous practices and strategies in this regard, but that should be better grounded in scientific evidence and not only be performed intuitively.

## CONTRIBUTIONS

Contributed to the conception or design of the study/research: Temoteo RCA, Silva JAS, Oliveira SS, Sales JRP, Fernandes MC, Carvalho JBL. Contributed to data collection: Temoteo RCA, Silva JAS, Oliveira SS, Sales JRP, Fernandes MC, Carvalho JBL. Contributed to the analysis and/or interpretation of data: Temoteo RCA, Silva JAS, Oliveira SS, Sales JRP, Fernandes MC, Carvalho JBL. Contributed to article writing or critical review: Temoteo RCA, Silva JAS, Oliveira SS, Sales JRP, Fernandes MC, Carvalho JBL. Final approval of the version to be published: Temoteo RCA, Silva JAS, Oliveira SS, Sales JRP, Fernandes MC, Carvalho JBL.

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