Planning and Sizing of the Health Workforce in Brazil: advances and challenges

Planejamento e Dimensionamento da Força de Trabalho em Saúde no Brasil: avanços e desafios

Desirée dos Santos Carvalho[1,2], Elisabet Pereira Lelo Nascimento[1], Silvia Aparecida Maria Lutaif Dolci Carmona[1], Vânia Maria Corrêa Barthmann[1], Maria Helena Pereira Lopes[1], Júlio César de Moraes[1]

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ABSTRACT This study aims to analyze the production of knowledge about Planning and Sizing of the Health Workforce (PDFTS) developed in Brazil, identifying models and methodologies that consider the Guidelines of the Unified Health System (SUS) for the constitution of regionalized care networks. This is an integrative review, including Brazilian studies and full text, in Portuguese, and available in the CAPES, BVS and Google Scholar databases. The searches returned 48,083 documents and, after selection with the PRISMA strategy, 62 studies published between 2011 and 2020 were included. Most of the analyzed productions approach the PDFTS with comparative analyzes between the estimated needs and the current availability, being more frequent the studies of only one professional category, with emphasis on nursing. The findings contribute to the debate on the essentiality of the health workforce for the conformation of networks, by demonstrating that the calculation methods favor the use of indicators and parameters related to the provision of services in specific health facilities, especially hospitals, not operationalizing aspects of regionalization and systemic integration of the Health Care Network.

KEYWORDS Personnel downsizing. Health workforce. Health planning. Regional health planning.

RESUMO *Este estudo visa a analisar a produção de conhecimento acerca do Planejamento e Dimensionamento da Força de Trabalho em Saúde (PDFTS) desenvolvida no Brasil identificando modelos e metodologias que consideram as diretrizes do Sistema Único de Saúde (SUS) para a constituição de redes de atenção regionalizadas. Trata-se de uma revisão integrativa, incluindo estudos brasileiros e com texto completo, em português, disponível nas bases de dados Capes, BVS e Google Acadêmico. As buscas retornaram 48.083 documentos e, após seleção com a ferramenta Prisma, foram incluídos 62 estudos publicados entre 2011 e 2020. A maioria das produções analisadas aborda o PDFTS com análises comparativas entre as necessidades estimadas e a disponibilidade atual, sendo mais frequentes os estudos de apenas uma categoria profissional, com destaque para a enfermagem. Os achados contribuem à promoção do debate sobre a essencialidade da força de trabalho em saúde para a conformação das redes, ao demonstrar que os métodos de cálculo privilegiam o uso de indicadores e parâmetros relacionados à oferta de serviços em estabelecimentos de saúde específicos, especialmente hospitais, não operacionalizando aspectos de regionalização e integração sistêmica da Rede de Atenção à Saúde.*

PALAVRAS-CHAVE *Dimensionamento dos recursos humanos. Recursos humanos em saúde. Planejamento em saúde. Regionalização.*

[1] Universidade Federal de Goiás (UFG), Centro de Inovação em Gestão da Educação e do Trabalho em Saúde (Cigets) – Goiânia (GO), Brasil.
desireecarvalho@ufg.br

[2] Ministério da Saúde (MS), Grupo Hospitalar Conceição (GHC) – Porto Alegre (RS), Brasil.

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Introduction

The Planning and Sizing of the Health Workforce (PDFTS) is the process that systematically and continuously evaluates the workforce needs, resulting in the adequate number of people to perform the activities according to planning, strategic objectives and institutional policies[1].

The planning of health actions and services of the Unified Health System (SUS) should ensure the acknowledgement of health conditions and determinants, policy formulation and assistance to people by means of the formation of integrated and regionalized networks[2]. The organization of the Health Care Network (RAS) reduces the fragmentation of the system and enhances the integration, continuity and coordination of care[3]. RAS operation is dedicated to the population and to the specified health region, and has as attributes the operational structure, organized in three levels of care (primary, secondary and tertiary), the health care model and the existence of an adequate, competent, committed Health Workforce (SF) with incentives to achieve the objectives of the system[4].

Thus, PDFTS is a relevant problem concerning Health Work Management (GTS). It stimulates researchers to better understand the process of predicting and assessing personnel number and quality and is a powerful tool to boost the composition of teams that assist in the transformations necessary for SUS[5,6] consolidation.

That said, this study does not opt for an exact concept of PDFTS. Here, we broadly consider the actions and strategies to quantify the workforce in a given territory, service or health system, comprising the many faces of activities that precede and compose PDFTS. It recognizes that the structure of FTS as to RAS formation is a challenge[5] and that studies on this subject are essential to the understanding of paths under implementation in the health system.

The literature identifies PDFTS need to contemplate all levels of care, meet demands related to demographic and epidemiological transitions[7], and to promote discussion on the scope of action of professional categories and actual needs of services and population[8], as well as broader research to strengthen evidences that support decision-making on personnel estimation models as for health[9].

Although the preparation of studies on health planning concerning public health tends to be influenced by political events such as the publication of new regulations[10], the scientific production on PDFTS between 1964 and 2013 depicted the tendency to use normative methods based on economic issues and concentrated in hospitals, despite the various social and political scenarios over the period[8].

Thus, it is worth mentioning that the policy of dividing in regions and organizing in networks carried out in SUS was propelled and renewed between 2010 and 2011 by means of the publication of new legal norms bringing concepts and guidelines as for RAS structuring with emphasis on users as the fundamental of care, and provision of actions planned and organized as regards to the population health needs; the horizontal relations between the points and levels of health care, with different roles, albeit the same importance; and multi professional care[4,11]. From this perspective, it is relevant to update the literature review on PDFTS that identifies its relations with RAS structuring in Brazil.

This study investigates publications on the subject with the aim of identifying models and methodologies applied in Brazil that regard health regionalization, the different services and levels of care, and multi professional care.

Methodological path

An integrative literature review was conducted[12] with the purpose of answering the following question: 'What FTS planning and sizing methodologies are under development in Brazil?'.

The time frame from 2010 on considered the hypothesis that RAS guidelines standardization[4], which occurred that year, affected the forms of PDFTS in Brazil. The choice of publications dealing with this issue was based on the understanding that SUS specificities of functioning and organization are applied solely in Brazil.

The investigation was carried out by means of electronic databases contained mainly in the Virtual Health Library (VHL) and in the Portal of Journals of the Coordination for the Improvement of Higher Education Personnel (CAPES' Portal of Journals). Relevant publication that might not be found in the scientific literature were also sought. Thus, the bases available in Google Scholar were additionally used.

Aiming at greater sensibility, broad search strategies using keywords and alternative terms selected from the Descriptors in Health Sciences (DeCS) edition 2020 were created, as well as expressions that, although not standardized, are often used to address this theme in the field of collective health, as explained in *table 1*. As for data collection, researchers carried out the initial search between October and November 2020, scheduling alerts in the databases whenever new documents were inserted by the end of that year.

Table 1. Applied search strategies and selected fields, as per each investigated database

	SELECTED FIELDS		
SEARCH STRATEGIES	**VIRTUAL HEALTH LIBRARY**	**CAPES PORTAL OF JOURNALS**	**GOOGLE ACADEMIC**
A - ("downsizing organizacional" OR "dimensionamento de pessoal") AND (SUS OR saúde)	'title, abstract, subject'	'any + 'contains'.	-
B - "health workforce" OR "human resources in health" OR "administration of human resources in health" OR "human resources management in health" OR "assessment of human resources in health" OR "staff turnover" OR "personnel administration" OR "human resources administration"	'subject descriptor'	'no subject' + 'contains'	-
C - ("workforce planning" OR "workforce sizing") AND (health OR SUS)	'title, abstract, subject'	'any' + 'contains'.	'with the exact phrase' + 'with at least one of the words'

Source: Prepared by the authors.

Initially, the inclusion criteria were the Brazilian studies published between 2010 and 2020 dealing with the theme of FTS planning and sizing and providing full text in Portuguese. Abstracts and presentations without full texts, editorials and duplicate documents were excluded.

The documents found in the databases were selected during the search process by means of the filters available in each data source. Then, the researchers performed the screening of the eligible documents. The pre-selection was carried out by two different groups of three researchers each by the reading of the title and, whenever necessary, the abstract of all documents, as to provide greater specificity. Subsequently, meetings were held between the groups so to decide

which documents would be selected for full reading in the exploratory phase. It was also decided that the documents found referring to a book chapter or to a piece of larger material, such as a report or event, would be read in full and, according to the inclusion and exclusion criteria, would be analyzed and catalogued as individualized materials, whenever appropriate.

During the exploratory phase, the complete reading of each material was carried out by all researchers so to identify the adequacy and coherence of the data systematization instruments and the analysis categories previously proposed, as well as the ability to answer the research question. The intention was to avoid losses by not clearly identifying the actual content by reading solely titles and abstracts and, at the same time, to expand the conditions to better specify the study. This phase allowed for the characterization of the knowledge production on the subject. It also revealed that several documents approached the subject indirectly, analyzing parameters that can be useful for the process or, for example, only quoting methodologies, although the authors used keywords related to PDFTS.

Then, the sample was debugged by only including the studies that evidenced the ability to answer the research question, i.e., those that explored or applied one or more PDFTS methodologies and described in the text body the method used. It was decided to exclude from the final selection the review studies and those published in 2010, for all were written before the aforementioned SUS standardization of RAS.

The information extracted from the selected studies were cataloged and systematized in the Microsoft Excel program, and classified according to the study approach; the professional categories involved; and the model or calculation method applied to FTS sizing and its relation to health regional division, to the care model and to RAS services or level of care.

Due to being a bibliographic study, it was not required to be submitted to the Research Ethics Committee, while respect for ethical aspects was granted in all phases of the research, following the provisions of the National Health Council[13].

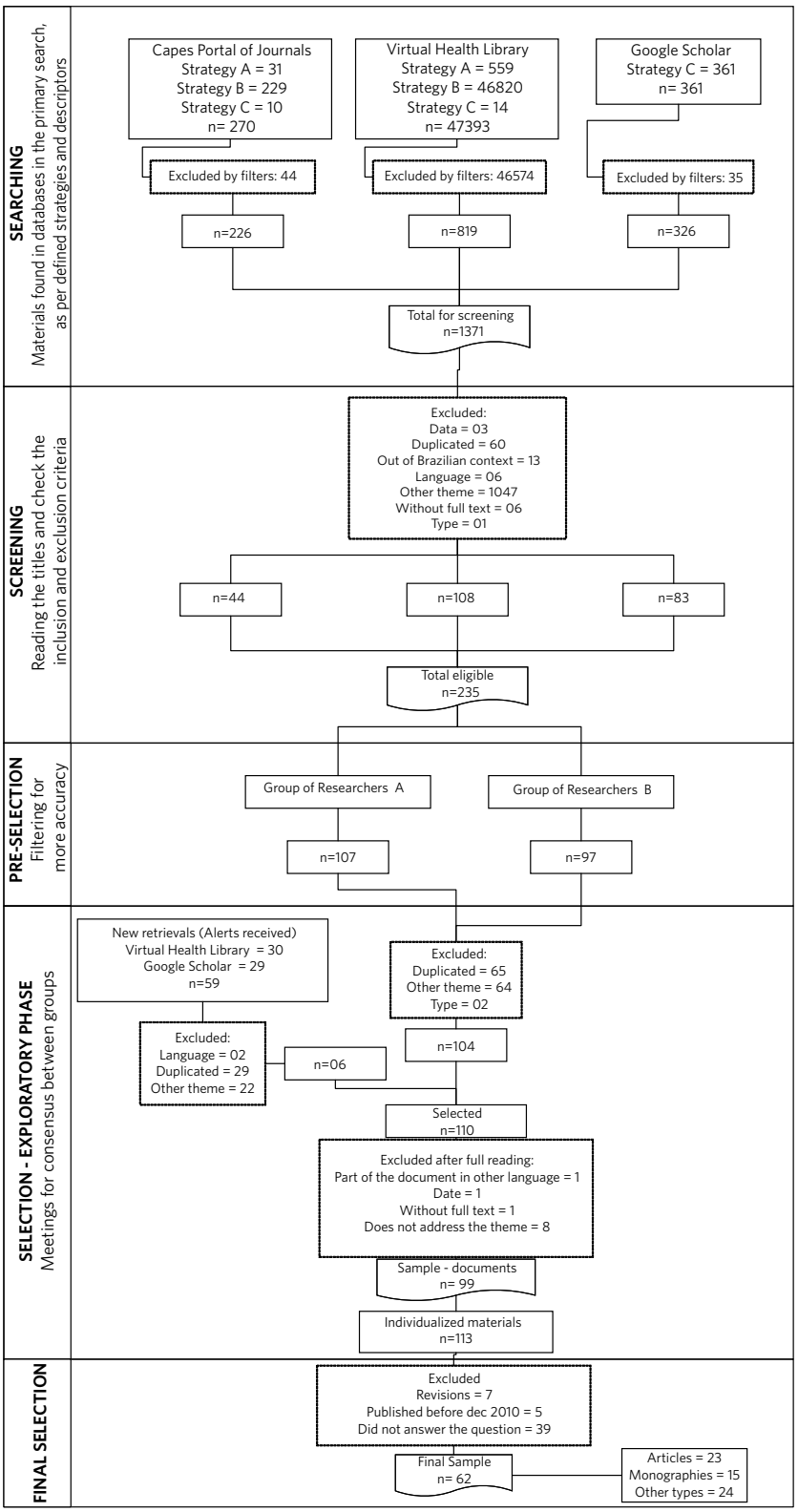
Results and comments

The searches retrieved 48,083 documents, of which, after the selection process that included the full reading, 62 publications were the subject of this review (*figure 1*). At least one was found in each of the ten years investigated; the lowest number of publications occurred in 2014 and 2019, being two in each year, while the biggest number of thirteen works were published in 2020. In this latter, although the highest volume of productions (20.9%) could be linked to GTS efforts to provide personnel to meet the demands caused by COVID-19, a single study was related to the pandemic[14].

Among the selected productions are monographs (24.2%), journal articles (37.1%) and other kinds of documents, such as book chapters, technical reports and others, which, together, equate to 38.7% of the selected sample (*figure 1*). This distribution reflects the characteristic of knowledge dissemination as for health planning in Brazil, most often found in technical documents and books[10].

The total of 179 authors were involved in the analyzed productions, noting that the five most frequent ones are nursing graduates. So, most articles were published in journals of this area (69.6%). The remaining were found in journals of collective health (13.1%), administration, management and policies (8.7%), health sciences (4.3%) and speech therapy (4.3%). It is noted that this characteristic confirms a higher frequency and volume of productions on nursing personnel sizing in PDFTS studies and trials in Brazil[8], even when the health field was not the only under observation, since 45% of the publications on econometric models of workforce projection in Brazil were found in nursing journals[9].

Figure 1. Illustrative flowchart of materials search and selection process, as per PRISMA protocol



Source: Prepared by the authors.

Approaches

Three different approaches to PDFTS were identified in the studies. The first focus on recognizing the required workforce. Among the studies with this approach, only one aims, exclusively, to show the estimate of personnel need by hospitals[15], while the remaining involve broader productions, either by defining minimum standards[16] or proposing methodology[17] and development of tools[18,19] that enable these estimates carrying out.

The second approach refers to the workforce diagnosis and is present in studies that intend to collect information on the current FTS in a given geographic space, service or health region, mapping its composition and distribution[20-23] or profiling its personnel[24].

As a result of sizing, the learning of differences between the planned and the existing workforce[25] is expected. Thus, several publications[26-30] disseminate the PDFTS experiences, where to ascertain of also the existing workforce as the estimated one as ideal or necessary are performed, thus combining the two approaches aforementioned and providing a comparative analysis.

The comparative analysis was the third approach observed and the most frequently accounted (84%). In this regard, comparisons were also provided between workforces at different times, premises or places, with emphasis to some publications that list the differences in FTS composition or distribution among municipalities regarding their size[31], among public and private health subsystems, and among the regions of Brazil[14]. Other studies[32-36] described and analyzed FTS historical evolution of a given service or level of care as preparatory activity or phase of the PDFTS process.

This approach is useful not only for the production of thinking on PDFTS but also for putting reality under context, assisting in the decision-making and the continuing education processes related to GTS[33].

Professional categories and occupations

The actions on which the population health care depends involve a broad set of workers who are addressed to various occupations[14]. Regarding the inclusion of these workers, there was a predominance of studies that include only one professional area or occupation (62.9%).

Most studies account only for nursing (26). Of these, the majority (22) refers exclusively to hospital care (*table 2*) and only four of them refer to other areas of activity. In the first, Paula[17] builds and proposes to the Federal Nursing Council (COFEN) a methodology for identifying the number of professionals needed to assist in Long Stay Institutions for the Elderly (ILPIS) in the municipalities of Rio de Janeiro State. Zopi[37] verifies, from nurses' report, the adequacy of the nursing workforce in primary health care (PHC) units in Cuesta Polo Health Region in the State of São Paulo. Bonfim[38], on the other hand, presents an investigation involving Family Health Units of ten Brazilian states with the use of the method Workload Indicators of Staffing Needs (WISN). Finally, COFEN Resolution No. 593/2017[16] suggests methodologies and parameters regarding the nursing sizing in several areas, applicable throughout the Country.

The focus of the studies on nursing personnel corroborates the findings of previous systematic reviews[7,9], which, when identifying FTS sizing methodologies, found that 66.6%[9] and 78.6%[7] of the studies addressed this area.

The nursing area is essential to health services and is internally dependent on nurses, auxiliaries and nursing technicians[39]. It should be noted that, when assessing the 26 studies with this focus, it was found that all approached the whole team, without excluding any of the categories. Some even included, as part of the team, subcategories not predicted in the nursing personnel sizing regulated by COFEN[16], such as nursing students[40] and caregivers[17].

Table 2. Selected materials that deal exclusively with nursing sizing in hospital care, as per the approach, method, hospital unity and location

AUTHOR, DATE	TITLE	WORKFORCE SIZING METHOD	UNITY	LOCATION
Approach – Identification of the needed workforce				
Gaidzinski et al., 2011.[19]	Computerized sizing of nursing professionals: development of a software	Gaidzinski Method, 1998.	Inpatient Units: Adult Medical Clinic; Adult Surgical Clinic; Adult Medical-Surgical Clinic; Pediatrics; Maternity without or with Rooming-in System; Nursery; Adult General Intensive Care Unit; Cardiac Intensive Care Unit; Pediatric Intensive Care Unit; Neonatal Intensive Care Unit and Semi-Intensive Unit	-
Quiñones, 2019.[18]	Development of a tool for sizing nursing teams of intensive care units	Proposed by the author.	Adult ICU	Rio de Janeiro - RJ
Approach – Comparative Analysis				
Alves et al., 2011.[41]	Assessment of the patient degree of dependence in a teaching hospital orthopedic ward	Gaidzinski e Fugulin Method, 2005.	Inpatient Unit: Orthopedics Ward	Botucatu - SP
Gil et al., 2011.[35]	Sizing of nursing staff and patient degree of dependence in a university hospital	Survey of the existing workforce.	Inpatient units: adult medical-surgical	Londrina - PR
Perroca; Jericó; Calil, 2011.[42]	Configuration of the nursing team in Intensive Care Units	Survey of the existing workforce: Professional per bed index	Intensive Care Unit	São José do Rio Preto - SP
Rogenski et al., 2011.[36]	Nursing care time in a teaching hospital	Gaidzinski Method, 1998.	Inpatient Units: Surgical Clinic; Medical Clinic; Joint Accommodation; Pediatric Clinic; Nursery and Pediatric Intensive Care; Adult Intensive and Semi-Intensive Care	São Paulo - SP
Rossetti e Gaidzinski, 2011.[43]	Estimation of the nursing team required in a new hospital	Methods of Gaidzinski, 1998 e Fugulin, 2002.*	Inpatient units: Obstetrics; Medical Surgical; Pediatrics; Adult and pediatric ICU; and Neonatal	São Paulo - SP
Vituri et al., 2011.[44]	Hospital nursing sizing: PAHO/WHO model	PAHO/WHO Method	Outpatient Surgery; Inpatient Units: Medical Clinic; Nursery; Normal or Rooming-in; Surgical Clinic; Gynecological; Psychiatric; Pediatric Clinic; Obstetric; Prepartum; MI/AIDS Clinic; Semi Intensive; Burn Clinic; General ICU; Neonatal ICU; Anesthetic Recovery; Emergency Room Observation.	Londrina - PR
Fugulin et al., 2012.[45]	Nursing care time in intensive care unit: assessment of the parameters proposed by COFEN Resolution No. 293/04	Methods of Gaidzinski, 1998 e Fugulin, 2002.*	Adult Intensive Care Unit	São Paulo - SP
Matos et al., 2012.[40]	Sizing of nursing staff in a clinical unit	Methods of Gaidzinski, 1998 e Fugulin, 2002.*	Hospital Clinical Unit	Northwest Region – RS**
Velozo, 2012.[46]	Sizing of nursing staff using the TISS-28 and NEMS scores in a Pediatric Intensive Care Unit in Southern Brazil	Methods of Gaidzinski, 1998 e Fugulin, 2002.*	Pediatric Intensive Care Unit	Porto Alegre - RS
Casarolli et al., 2015.[47]	Level of care complexity and nursing sizing in the emergency room of a public hospital	Methods of Gaidzinski, 1998 e Fugulin, 2002.*	Emergency room	Paraná**
Lorenzini; Deckmann; Silva, 2015.[48]	Sizing of nursing staff in obstetric center	Methods of Gaidzinski, 1998 e Fugulin, 2002.*	Obstetric Center	South of Brasil**

Table 2. (cont.)

AUTHOR, DATE	TITLE	WORKFORCE SIZING METHOD	UNITY	LOCATION
Costa, 2015.[49]	Method for sizing nursing staff in a Material and Sterilization Center (CME)	Proposed by the author.	Sterilization Material Centers	São Paulo - SP
Araújo et al., 2016.[50]	Staff sizing of a surgical inpatient unit	Methods of Gaidzinski, 1998 e Fugulin, 2002.*	Surgical Inpatient Unit	Belo Horizonte – MG
Borges et al., 2017.[51]	Sizing of nursing staff in the adult ICU of a public university hospital	Inoue e Matsuda Method, 2010.	Adult Intensive Care Unit	Cascavel - PR
Pedro et al., 2017.[52]	Sizing of nursing staff in the pediatric ward of a university hospital	Soares Method, 2009.*	Pediatric ward	Cascavel - PR
Teixeira, 2017.[53]	Sizing and nursing workload in pediatric and neonatal ICU	Inoue e Matsuda Method, 2010.	Neonatal and pediatric Intensive Care Units	Paraná**
Vasconcelos et al., 2017.[54]	Sizing of hospital nursing staff: study with Brazilian government parameters from 2004 and 2017	Methods of Gaidzinski, 1988 e Fugulin, Gaidzinski e Kurcgant, 2005.*	Inpatient Unit: Neurology and Orthopedics	Cascavel - PR
Velozo et al., 2017.[55]	TISS-28 versus NEMS scores to size the nursing team in a pediatric intensive care unit	Fugulin, Gaidzinski e Kurcgant Method, 2005.*	Pediatric Intensive Care Unit	Porto Alegre - RS
Souza et al., 2018.[56]	Sizing of nursing staff in adult intensive care	Inoue e Matsuda Method, 2010.	Adult Intensive Care Unit	Maringá - PR
Pedro et al., 2018.[57]	Sizing of nursing staff in the surgical center of a university hospital	Possari Method, 2001.*	Surgical Center	Cascavel - PR

Source: Prepared by the authors.

* Authors refer to the Nursing Council Resolution as a method.

** Municipality where the service or health premise not identified in the study is located

Among the remaining productions addressed to only one profession or occupation (*table 3*), stand out those of higher education level training: most refer to physicians (9), two are dedicated to speech therapists, and one to pharmacists. A study reports the PHC administrative personnel sizing, reinforcing their relevance for the Basic Health Units (UBS)[26] operation.

The authors consider the analysis of the medical workforce a challenge characterized by the scarcity of Brazilian studies on the subject and the lack of information pattern in data sources available on these professionals[58,59]. Therefore, the studies retrieved are extremely important to create knowledge and overcome such limitations.

Although physicians, dentists and nursing professionals traditionally occupy most of Brazil' FTS, the involvement of other professions has gradually increased over the years, especially in PHC[32,34]. Nascimento' study[60] evinces, for example, the relevance of criteria creation as for the sizing of speech therapists to function in network, while Soares[23] reveals the growth of pharmacists' engagement at the municipal level. Thus, these studies contribute to

broaden the debate on PDFTS, standing out the role of other professions in FTS structure and raising questions about more updated team arrangements in SUS.

Table 3. Selected materials that deal with the sizing of a professional category or occupation, as per the approach, category or occupation, method, level of attention or service sized, and location

AUTHOR, DATE	TITLE	WORKFORCE SIZING METHOD	LEVEL OF ATTENTION AND/OR SERVICES	LOCALION
Approach - Workforce Diagnosis				
PHARMACIST				
Soares, 2020.[23]	Pharmaceutical Workforce at the Health Department of the Municipality of Florianópolis	Survey of the existing workforce: professional ratio per inhabitant.	Primary and Secondary Care: Health Centers, Psychosocial Care Centers, Polyclinics and Emergency Care Units	Florianópolis – SC
PHYSICIAN				
Seixas et al., 2012.[20]	Project: MigraMed II - Education and Health: Structural and Institutional Conditions for the Attraction and Settlement of Physicians in the National Territory	Survey of the existing workforce.	All	Brazil
Approach – Comparative Analysis				
ADMINISTRATIVE ASSISTANT				
Cruz; Oliveira, 2013.[26]	Study for the resizing of Administrative Auxiliaries in the Basic Health Units of the Municipal Health Department of Belo Horizonte	Survey of the existing workforce and estimation of the administrative staff work hours necessary as per the size of the units.	Primary Care: Basic Health Units	Belo Horizonte – MG
SPEECH THERAPIST				
Nascimento; Nakamura, 2018.[31]	Speech therapy at the Unified Health System of the State of São Paulo	Survey of the existing workforce: professional ratio per inhabitant.	All	São Paulo
Nascimento, 2020.[60]	Stories of the speech therapy introduction in the Unified Health System: water encounters	Adaptation of the Workload Indicators of Staffing Need - WISN - proposed by the author.	All	*
PHYSICIAN				
Girardi et al., 2013.[58]	Medical Labor Market: scarcity and inequalities in the distribution of the workforce in Brazil	Adaptation of the "Demographic Components Method" – professional ratio per inhabitant.	All	Brazil
Machado, 2015.[61]	Sizing the workload in a high complexity unit of traumatology and orthopedics	Workload Indicators of Staffing Needs – WISN.	Hospital Care: Orthopedics	Rio de Janeiro - RJ
Martins, 2016.[62]	The need of specialists in Obstetrics and Gynecology for the Unified Health System - SUS in the state of Pernambuco	Survey of the existing workforce.	All	Pernambuco

Table 3. (cont.)

AUTHOR, DATE	TITLE	WORKFORCE SIZING METHOD	LEVEL OF ATTENTION AND/OR SERVICES	LOCALION
Matsumoto, 2018.[63]	Parameters for the sizing of physicians in the Family Health Strategy	Workload Indicators of Staffing Needs – WISN.	Primary Care: Family Health Units	Brazil
Pierantoni et al., 2011.[64]	Working Indicators for Family Health Strategy Professionals	Workload Indicators of Staffing Needs (WISN).	Primary Care: Family Health Units	Juiz de Fora – MG
Pierantoni et al., 2013.[65]	Strengthening the human resources planning capacity for National Health Systems	Projection of needs - professional ratio per inhabitant.	Primary Care: Family Health Units	Brazil
Pierantoni; Magnago, 2015.[59]	Offer and Needs of Health Human Resources	Projection of needs - professional ratio per inhabitant.	Primary Care	Brazil
Silva, 2011.[66]	Behavior of the medical and pediatric clinic shifts of the emergency services of the health network in the city of Recife from August 2009 to July 2010	Survey of the existing workforce.	Emergency Services	Recife - PE

Source: Prepared by the authors.

* This is a proposal applicable to any territory.

All 14 health professions recognized in Brazil[67] were found in the set of selected studies. In general, nurses and physicians were more frequent, while physical education professionals were the least cited.

Table 4 lists the selected publications addressing the workforce of several occupations in the same study (37.1%). Such publications, when guided by the perspective of teamwork, seem to approach the fundamentals of multi disciplinarity and multi professionality that enable FTS diversification[32].

As to Peduzzi et al.[68], teamwork brings strategic components and reinforces characteristics necessary to face the increasing complexity of health needs, organization of services and networking health care systems, aiding the improvement of health care quality of the population.

In this regard, one can note two articles that analyze all health professions, identifying their presence[32], growth and regional distribution in PHC[36] context, a level of care considered a coordinator of care and strategic to implement the care model.

Broadening the vision beyond these 14 professions, Mora and Rizzotto[21] include, in the analysis of FTS composition and distribution, the remaining workers with specific health training, as technicians in nutrition and clinical pathology. FTS studies on public hospitals in the State of Tocantins included all occupations involved in the care of users, even those that are addressed to indirect support, such as managers, porters and electrical technicians[33,69], but not hierarchizing workers as to the level of education.

Table 4 also summarizes that 43.5% of the studies including more than one occupation in PDFTS explicitly consider workers of all levels of training, recognizing, in practice, the diversity of categories that the health work process complexity requires. However, it is noteworthy that the production of knowledge in this sense is not yet significant in the scientific literature, since only one of these cases was published in a journal[30]. The remaining ones were mostly published in books, confirming the need to expand the dissemination by means of scientific

journals following a renewed agenda of collective health[10], besides recognizing that health improvement requires, above all, actions carried out by a different FTS[32].

Table 4. Selected materials that deal with the sizing of two or more professional categories or occupations, as per approach, level of workers' education, method, level of care or service sized, and location

AUTHOR, DATE	TITLE	WORKFORCE SIZING METHOD	LEVEL OF ATTENTION AND/OR SERVICES	LOCATION
		Approach - Workforce Diagnosis		
		TECHNICAL AND HIGHER LEVELS WORKERS		
Mora; Rizzotto, 2016.[21]	Health workforce and hospital network in the 9th health region of Paraná	Survey of the existing workforce.	Hospital Care	9ª Health Region – PR
		BASIC, TECHNICAL AND HIGHER LEVELS WORKERS		
Rizzotto et al., 2014.[22]	Workforce and management of health work: revelations from the External Evaluation of the National Program for Improving Access and Quality of Primary Care in Paraná	Survey of the existing workforce.	Primary Care: Basic Health Units	Paraná
Souza et al., 2013.[24]	Sizing the Workforce due to the Reconstruction of Health Surveillance of the Undersecretary of State for Health of the Federal District	Survey of the existing workforce.	Environmental, Sanitary and, Epidemiological Surveillance, Occupational Health and Central Public Health Laboratory.	Federal District
		Approach - Identification of the Required Workforce		
		WORKERS OF ANY LEVEL OF TRAINING - NOT SPECIFIED		
Fagundes, 2015.[15]	Estimate of the need for medical professionals in a unit: practical calculation	Estimate of needs according to installed capacity, activity time, workload of categories and parameters chosen.	Hospital Care	*
		Approach – Comparative Analysis		
		HIGHER-LEVEL WORKERS		
Carvalho et al., 2016.[32]	Expansion and diversification of the higher-level workforce in basic health units in Brazil, 2008-2013	Survey of the existing workforce.	Primary Care: Basic Health Units	Brazil
Carvalho et al., 2018.[34]	Need and dynamics of the workforce in Primary Health Care in Brazil	Survey of the existing workforce.	Primary Care: Basic Health Units	Brazil
Silva, 2020.[70]	Staff sizing for palliative care in a complex oncology institution	Workload Indicators of Staffing Needs – WISN	Hospital Care: Outpatient Clinic, Home Care, Pharmacy, Hospitalization, Physiotherapy and Emergency Care	Rio de Janeiro – RJ
		FUNDAMENTAL OR MEDIUM AND HIGHER LEVELS WORKERS		
Lopez et al., 2020.[14]	Mapping of health professionals in Brazil: some notes in regarding the health crisis of COVID-19	Survey of the existing workforce.	All	Brazil

Table 4. (cont.)

AUTHOR, DATE	TITLE	WORKFORCE SIZING METHOD	LEVEL OF ATTENTION AND/OR SERVICES	LOCATION
TECHNICAL AND HIGHER LEVELS WORKERS				
Pereira et al., 2018.[27]	Sizing of the administrative workforce: application of the method in two units of SUS federal management	Estimate of needs based on the collection and analysis of information on the results of areas and identification of the professional profile required for the units.	SUS management units	Federal District + Unidentified Federation Unit
WORKERS OF ALL LEVELS OF TRAINING				
Àvila et al., 2020.[33]	Dimensioning of the workforce: historical and comparative analysis of the General Hospital of Palmas (TO)	Survey of the existing workforce.	Hospital Care: all áreas	Palmas – TO
Àvila et al., 2020.[69]	Workforce and hospital indexes: comparative analysis of two state units in Tocantins	Survey of the existing workforce.	Hospital Care: all areas	Palmas e Araguaína – TO
Carvalho; Nascimento, 2020.[71]	Sizing of the health workforce of the municipality of Fortaleza – CE: technical report	Estimate of needs based on the number of inhabitants and classification of vulnerability of territories (APS); the size and physical structure of the unit (UPAs); the monthly average of medical appointments performed and physical structure (Polyclinics) and the professional index per bed (Hospitals).	Primary Care: Basic Health Units; Secondary Care: Emergency Care Units and Polyclinics; and Hospital Care.	Fortaleza – CE
Guimarães et al., 2020.[72]	Strengthening of the work management in primary care: sizing of the workforce in Maringá-PR	Estimate of needs based on population definitions, criteria and parameters by categories, as per the vulnerability classification of the territories.	Primary Care: Basic Health Units	Maringá – PR
Marques; Goulart Castro, 2016.[73]	Human Resources Sizing in Primary Care – The experience of the Municipal Secretary of Campinas (SP)	Estimate of needs based on guiding questions: For whom? What to offer? How to do it? How many?	Primary Care: Basic Health Units	Campinas – SP
Nascimento et al., 2020.[6]	Planning and Sizing of the health workforce: courseware for health departments	Estimate of needs based on the number of inhabitants and classification of the territories vulnerability (APS); and the installed capacity, production and work processes (Secondary and Tertiary Care).	Primary Care: Basic Health Units; Secondary and Tertiary Care	*
Nascimento; Carmona, 2020.[29]	Experience of sizing elaboration in primary care of the Municipal Health Secretary of Campinas	Estimate of needs based on the ascription of UBS clientele and the vulnerabilities classification in the territory, as per chosen indexes and parameters.	Primary Care: Basic Health Units and Family Health Support Centers	Campinas – SP
Oliveira, 2018.[74]	Proposal of a model for sizing of the personnel as to the Clinical Engineering service for the university hospitals of the Federal University of Ceará	Estimate of needs based on the definition of work processes, manageable items, average time for each activity, positions and profiles of professionals demanded.	Hospital Care	Fortaleza – CE

Table 4. (cont.)

AUTHOR, DATE	TITLE	WORKFORCE SIZING METHOD	LEVEL OF ATTENTION AND/OR SERVICES	LOCATION
Possa; Gosch; Ferla, 2020.[25]	Workforce planning and sizing: a device-tool for the management of work and health education	Estimate of needs as to agreements and systematization of the scope of the service, workers' practices and parameters.	All	*
Rocha et al., 2020.[30]	Sizing of the workforce of the State Secretary of Public Health of Rio Grande do Norte	Survey of the existing workforce.	Hospital units; Administrative regional units; Therapeutic agent units; Blood centers; Laboratories; Milk Bank; Child and Adult Rehabilitation Center; Personnel Training Center in Health Services; Death Verification Service; Central of the Metropolitan Samu the 'Central Level'.	Rio Grande do Norte
INCLUDES UNSPECIFIED TRAINING LEVEL WORKERS				
Ávila et al., 2020.[75]	The process of planning and sizing the workforce in SUS hospitals: the experience of a training-intervention in the Tocantins State Secretary of Health	Estimate of needs as per project scope definition, health network analysis, description of existing workforce; comparative analysis of the workforce and; the sizing of the workforce.	Hospital Care: Assistance Areas, Technical Support and Diagnostic Support	Palmas – TO
Cruz et al., 2013.[76]	Sizing of the Workforce in the Assistance Units of the Network pertaining to the Health Secretary of the State of Bahia – Sesab	Estimate of needs based on the acknowledgement of the physical structure, the installed capacity and the work process, and the assessment of technical parameters.	Hospitals and 'Reference Centers'.	Bahia
Marques; Torres, 2013.[77]	Personnel sizing for the State Secretariat of Public Health of Rio Grande do Norte	Survey of the existing workforce and estimate of needs as to negotiation with managers after applying parameters, as per the profile, demand and care model of the unit.	Hospitals and 'Reference Units'.	Rio Grande do Norte
Ventin; Pereira; Moraes, 2019.[28]	Workforce sizing: the innovative experience of the Ministry of Health	Estimate of needs based on the application of quantitative information on results, effort and personnel in a mathematical model and analysis of qualitative information to identify the professional profile and level of computerization, the complexity and the added value of work processes.	Administrative areas of the Ministry of Health: National Health Fund, General Coordination of Personnel Management, Health Care Secretariat and State Center of the Ministry of Health in the State of Ceará.	Brasília – DF and Fortaleza – CE

Source: Prepared by the authors.

Health workforce sizing models and methods

Regarding the way of sizing, that is, the way of calculating and verifying the number of workers, studies have varied, spanning between those that contain detailed mathematical expressions that lead to a result and those that conceptually describe the steps or stages of the process, without disclosing the complete calculation or the result of a practical application.

Tables 2 to 4 reveals the predominance of studies carrying out the survey of the existing workforce without a pattern methodology or even recognized by specific terminology. Some studies calculate the workforce by applying secondary data available in local and national information systems[20,34,69], while others make direct observation of the work schedules of each health unit investigated[26,66], either in number of people or hours of one professional.

Looking differently, the structuring of SUS increasingly moves towards the imperative of PDFTS reference models that overcome the standardization of an ideal number per service, standing out for the complexity of this process and the uniqueness of the work and health care technologies as to health needs and the referring population[79].

The second approach frequently used for PDFTS among the selected publication relates directly to the predominance of nursing studies. They are applications of the models recommended in resolutions issued by the professional supervisory body, COFEN. Although the authors refer to those resolutions themselves as a method, Resolution No. 293/2004 particularly uses a methodology developed by Gaidzinki and Fugulin. In its most recent version, Resolution No. 543/2017 mentions the various references on which the recommendations for each area are grounded[16]. It was used to describe each study in *table 2*.

The aforementioned legislation determines the guidelines to estimate the number of nursing personnel required following the characteristics of the services, the nursing work processes, and the users' clinical conditions, regarding the workplace and, mainly, the degree of dependence and workload demanded for a given type of service[16]. It is also a reference for studies that do not use the calculation method indicated therein but are based on their parameters of technical safety index and minimum proportion between nurses and nursing technicians or auxiliaries, as seen in the studies developed by Borges et al.[51], Souza et al.[56] and Teixeira[53], where the methodology of Inoe and Matsuda was applied.

Research on sizing of nursing has scientific and social relevance, because, once it enables adequate qualitative-quantitative results, it can provide improvements in people's care[56]. In this regard, it is noteworthy that nursing methods themselves are well structured, applying terminologies or theoretical framework well described, which were mostly (17) found in the scientific articles. This reality is the outcome of the professional category investment in research and innovations on the theme.

The methodology of Workload Indicators of Staffing Need (WISN) was also quite addressed in the selected studies, being used for the sizing of nursing[38], physicians, speech therapists and of multidisciplinary team (*tables 3 and 4*). WISN is a methodology proposed by the World Health Organization for the calculation of personnel by applying time pattern measures of the activities that make up the workload and availability of each professional[7,78].

As to Monteiro et al.[78], the workload assessment of health professionals yields relevant information on sizing to support decision-making on the prevision, provision and allocation of resources in different areas.

However, among the WISN limitations, Pierantoni et al.[64] noted that it considers the workload and current productivity of professionals without taking into account schedules and restrained demand, besides not including important variables such as the perception of workers and managers and the health needs of the population. Concerning work processes, the author points out that, in multi professional and shared work, it would be impossible to standardize and individualize workloads for each professional.

In this regard, it is worth mentioning that the workload assessment appears in different degrees in the studies found in this review, including those that do not use their own method or instrument. As an example, we highlight the

sizing created by Carvalho and Nascimento[71], who propose the definition of the number of family health teams proportionally to the social vulnerability of the territory and the number of physicians, also according to the size of the Emergency Care Unit (UPA). Likewise, Cruz and Oliveira[26] suggest that the need for administrative auxiliaries follows UBS size. Thus, they understand that the workload will be proportional to the size or vulnerability, recognizing and assessing such variation in the workload as an important parameter to identify the required FTS.

A challenge put to PDFTS is to create metrics that consider the uniqueness of each location, the diversity of actions and the multiple professions; not the standardization of these measures[25,79]. Thus, the predominance of own methodologies or models not yet labeled, containing the description of stages performed or presenting adaptations of methods consolidated in studies that include multidisciplinary teams (*table 4*) symbolizes also the equilibrium to rigid norms as the effort to address this challenge.

Oliveira[74] proposes and simulates the application of a multi professional team sizing model to the clinical engineering area in university hospitals, offering a check list, a calculation instrument and the reference parameters for estimating the service demand and the execution time of each activity, following the local specificities of the scope of practices.

The method proposed by Possa, Gosch and Ferla[25] approaches sizing as a continuous process that includes stages of agreement on work processes and indicators and parameters to quantify the required FTS, among others. By associating PDFTS to health care models and to participatory processes that expand GTS capacity, the authors offer a methodological innovation applicable to any health service or team, although without reporting their experiment.

Thus, the workforce projection methodologies addressed to meet future needs using demographic variables to assess the demands[58,59,65] represent a counter-hegemonic movement in relation to the methods that propose to calculate FTS only from offers already made and services already created.

Possa et al.[80] understand that PDFTS should start from the user demand and not from the supply of services, which are strongly influenced by patterns determined normatively by training and corporative institutions, which, in turn, define the limits of knowing and doing of health workers, regardless of the singularities of territories and of each health region.

In this regard, the results of this literature review show that, although being more frequent to use workload measures related to care demands as for systems that classify users according to their clinical conditions and degree of dependence on care, some FTS quantification methods aggregate other and different variables, such as: relation between number of professionals and installed capacity; opening hours of services; age of the professionals; health needs of the population; and vulnerability conditions of the territory.

Regionalization and levels of RAS care

The articulations between RAS services, the population and the health teams occur in the territory. Therefore, it is not only the space where each health unit is inserted able to be sized[25] but also where there is greater explanatory capacity of the factors that interfere in the health condition, resulting in people's needs[6]. Thus, considering the singularities of each territory and health needs of people who attend these living spaces is essential to qualify the look of those who perform PDFTS.

Regarding the location of the studies, most (51.6%) methodologies were applied in southern and southeastern states (*tables 2 to 4*), possibly sampling the interstate and regional disparities in the supply of professionals throughout Brazil[14,34].

The local scope also predominates, being

PDFTS methods developed in one or more units of a health facility, with a major focus on hospital investigations, regardless of scope, what is consistent with findings of previous reviews[7,9]. Thus, production opposes the needs of comprehensive care, which requires the integration of RAS different levels of care and the availability of multidisciplinary teams so to provide health promotion, disease prevention and health recovery[4,3]. We mostly detect PDFTS studies involving only one point or care level (71%), a predominance that can feed and reinforce the fragmented logic still carried on in SUS, focused on the biomedical and hospital-centered model.

PDFTS can adopt multiple forms, that is, it can be outlined between processes mainly centered on hard technologies, focusing on standardized norms, or processes addressed to care sizing, centered on light technologies and health needs[81]. Thus, PDFTS methods embed the health care model currently applied and the way care is organized.

In this regard, the results of selected studies that identify deficits of nursing professionals can be noted while there is a surplus of nursing technicians or assistants[41,57], unveiling that such disproportion often compromises the offered quality of care[42]. However, this unequal distribution among the subcategories that make up the nursing workforce, showing a smaller number of nurses than recommended by COFEN to hospitals[45], corresponds to the nursing current characteristic in the Brazilian health system[39], and not to what the regulations aim for in the future.

The example confirms Ayres'[82] claim that health care models feedback the use and ways of managing and operating health technologies, in a dialectical relation between their organization and their operation in the everyday reality. Thus, so to evaluate the FTS able to provide SUS progress, recognizing a user-centered care model, it is necessary to overcome the analysis of hospital bed structures and services offering, also observing the diversity of work processes, the complex needs of the population, the regional realities and RAS structuring[5,6,79,83].

Although it is mandatory to overcome the weaknesses in work management through all health regions so to comply with SUS[4] planning, it was found that only 38.7% of the selected publication mentions regionalization or RAS.

When it occurs, the mention to the subject arises mostly by introducing SUS either in the beginning of documents or in the contextualization of the problems under investigation, without defining a direct relationship with PDFTS. Just three studies directly connected PDFTS to the organization of regionalized care networks, asserting that FTS sizing is strategic for RAS[6] structuring and characterizing the workforce within the scope of health regions[21,37].

The organization of SUS assume a coherent relation between health planning, policies and practices[84], as well as the construction of management models that respect their principles and drive new logics, breaking with centralizing hegemonic models focused on rigid norms[85], which hinders the understand that RAS structure is merely bureaucratic and normative[3]. It would be essential to develop PDFTS methodologies able to contribute to GTS policies in accordance to the need of multi-professional care and to the health model organized in RAS[83].

On the other hand, it is considered an advance to find, within the research decade, a set of publications aiming to understand rationality and evaluate possibilities for the use of WISN[64]; to prepare patterns recommendations[38,63,70]; to develop new methods and tools for PDFTS[49,74]; or even to offer courseware so that SUS managers and workers can be equipped for the PDFTS process[6].

Final comments

This integrative review contributes to the systematization of knowledge on PDFTS

published in Brazil between 2011 and 2020, although being important to mention the limitation entailed by the inclusion of texts just in Portuguese. The broad searches and the choice for not restricting the search to journals allowed for identifying and giving visibility to book chapters and other kinds of publication that describe practical experiences of actual and multiple Brazilian circumstances.

All health professions appear in the set of publications on PDFTS retrieved during the research decade, indicating an improvement. However, most of the production is dedicated to only one profession and focused on those demanding higher education. A gap is perceived as to multi-professional integration, and also as a challenge for SUS care model structuring. As in other literature reviews on this theme, nursing played the leading role, the major category among the objects and authors of the studies.

Several studies measure FTS by means of surveys on the number of professionals available or hired for work, analyzing their distribution and not properly estimating the number of necessary workers, limiting themselves to the identification and description of profiles. Amongst models that calculate the needs, most use the workload assessment as the main parameter and are limited to the application of sizing to a team or service or part of a hospital, without articulating with the singularities of each territory or RAS points, contributing more to the local management than to the management of the health system in its regional scope.

There is greater attention attributed to workload parameters related to the user clinical conditions to the detriment of other variables related to vulnerabilities and to RAS structuring scope in the territory, the latter, disregarded in the calculations, which, therefore, aids the analysis but does not actually influence the size and profile of the planned workforce. There is a scarcity of PDFTS methods that glimpse health regions under systemic condition and that include workers of all levels of care, curbing the analyses and evidencing the need to broaden the debate in this respect.

In order to overcome a PDFTS detached from SUS planning, showing low levels of workable guidelines for the structuring of regionalized networks, it is required to invest in knowledge construction and to undertake PDFTS models guided by the population health needs and by multi-professional care, aiming at the systemic integration of RAS points of attention in its regional diversity. It is also suggested that further studies be developed on PDFTS forms related to the emergency expansion efforts of FTS capacity, and on the diversity of bonds and working conditions recently affected by the emergence of COVID-19.

Collaborators

Carvalho DS (0000-0002-9223-6891)* contributed to the conception of the study; data selection, analysis and interpretation; content writing and critical review; and approval of the manuscript final version. Nascimento EPL (0000-0001-8649-6649)*, Carmona SMLD (0000-0001-6054-5860)*, Barthmann VMC (0000-0003-1256-6303)*, Lopes MHP (0000-0002-8048-7773)* and Moraes JC (0000-0002-8795-8590)* contributed to data selection, analysis and interpretation; content writing and critical review; and approval of the manuscript final version. ■

*Orcid (Open Researcher and Contributor ID).

References

1. Brasil. Ministério do Orçamento Planejamento e Gestão, Secretaria de Gestão, Comissão Europeia. Textos de referência em gestão de pessoas: dimensionamento de força de trabalho. Brasília, DF: MP, 2006.

2. Brasil. Lei nº 8080, de 19 de Setembro de 1990. Lei Orgânica da Saúde. Dispõe sobre as condições para a promoção, proteção e recuperação da saúde, a organização e o funcionamento dos serviços correspondentes e dá outras providências. Diário Oficial da União. 20 Set 1990.

3. Viana ALA, Bousquat A, Melo GA, et al. Regionalização e Redes de Saúde. Ciênc. Saúde Colet. 2018; 23(6):1791-8.

4. Brasil. Ministério da Saúde. Portaria de Consolidação nº 3 de 28 de setembro de 2017. Consolidação das normas sobre as redes do Sistema Único de Saúde. Diário Oficial da União. 29 Set 2017.

5. Carvalho DS, Nascimento EPL, Souza GH. Desafios do dimensionamento da força de trabalho para a conformação da rede de atenção a saúde. Saúde Colet. (Barueri). 2021; 11(61):4818-27.

6. Nascimento EPL, Carvalho DS, Carmona SAMLD, et al. Planejamento e Dimensionamento da força de trabalho em saúde: material didático para secretarias de saúde. Brasília, DF: IBICT; 2020. 135 p.

7. Machado CR, Dal Poz MR. Sistematização do conhecimento sobre as metodologias empregadas para o dimensionamento da força de trabalho em saúde. Saúde debate. 2015; 104(39):239-54.

8. Moura LP. Planejamento da força de trabalho em saúde: uma análise do período entre 1964 a 2013. [dissertação]. Salvador: Universidade Federal da Bahia; 2014. 45 p.

9. Vianna CMM, Pierantoni CR, França TC, et al. Modelos econométricos de estimativa da força de trabalho: uma revisão integrativa da literatura. Physis. 2013; 23(3):925-50.

10. Teixeira CF, Jesus WLA, Souza MKB, et al. Produção Científica sobre Política, Planejamento e Gestão em Saúde no Campo da Saúde Coletiva: Visão Panorâmica. In: Paim JS, Almeida Filho N. Saúde Coletiva: Teoria e Prática. Rio de Janeiro: Medbook; 2014. p. 585-94.

11. Brasil. Decreto nº 7.508, de 28 de junho de 2011. Regulamenta a Lei nº 8.080, de 19 de setembro de 1990, para dispor sobre a organização do Sistema Único de Saúde - SUS, o planejamento da saúde, a assistência à saúde e a articulação interfederativa, e dá outras providências. Diário Oficial da União. 26 Jun 2011.

12. Mendes KDS, Silveira RCCP, Galvão CM. Revisão integrativa: método de pesquisa para a incorporação de evidências na saúde e na enfermagem. Texto Contexto Enferm. 2008; 17(4):758-64.

13. Brasil. Ministério da Saúde. Conselho Nacional de Saúde. Resolução nº 510, de 07 de abril de 2016. Determina diretrizes éticas específicas para as ciências humanas e sociais. Diário Oficial da União. 24 Maio 2016.

14. Lopez FG, Palotti PLM, Barbosa SCT, et al. Mapeamento dos profissionais de saúde no brasil: alguns apontamentos em vista da crise sanitária da COVID-19. Brasília, DF: Instituto de Pesquisa Econômica e Aplicada; 2020. 20 p.

15. Fagundes AMS. Estimativa da necessidade de profissionais médicos de uma unidade; cálculo prático. Escuela Nacional de Sanidad. Madrid; 2015.

16. Brasil. Conselho Federal de Enfermagem. Resolução COFEN nº 543, de 18 de abril de 2017. Estabelece os parâmetros mínimos para dimensionar o quantitativo de profissionais das diferentes categorias de enfermagem para os serviços/locais em que são realizadas atividades de enfermagem. Diário Oficial da União. 8 Maio 2017.

17. Paula RCC. Dimensionamento de pessoal de enfermagem em instituição de longa permanência para idosos: estudo retrospectivo. [dissertação]. Niterói: Universidade Federal Fluminense; 2016. 103 p.

18. Quiñones AMM. Desenvolvimento de ferramenta de dimensionamento das equipes de enfermagem para unidades de terapia intensiva. [dissertação]. Rio de Janeiro: Universidade Federal do Estado do Rio de Janeiro; 2019. 111 p.

19. Gaidzinski RR, Fugulin FMT, Peres HHC, et al. Dimensionamento Informatizado de Profissionais de enfermagem: desenvolvimento de um software. In: Pierantoni CR, Dal Poz MR, França T. O Trabalho em Saúde: Abordagens Quantitativas e Qualitativas. 1. ed. Rio de Janeiro: CEPESC; 2011. p. 91-102.

20. Seixas PHDA, Corrêa AN, Silvestre D, et al. Projeto: MigraMed II – Educação e Saúde: Condicionantes Estruturais e Institucionais da Atração e Fixação de Médicos em Território Nacional. São Paulo; 2012. 109 p.

21. Mora CTR, Rizzotto MLF. Força de trabalho em saúde e rede hospitalar na 9ª região de saúde do Paraná. Ciên. Cuid. Saúde. 2016; 15(3):405-12.

22. Rizzotto MLF, Gil CRR, Carvalho M, et al. Força de trabalho e gestão do trabalho em saúde: revelações da Avaliação Externa do Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica no Paraná. Saúde debate. 2014; 38(esp):237-51.

23. Soares MS. Força de Trabalho Farmacêutico na Secretaria de Saúde da Prefeitura Municipal de Florianópolis. [monografia]. Florianópolis: Universidade Federal de Santa Catarina; 2020. 52 p.

24. Souza NR, Cunha CSC, Valença JC, et al. Dimensionamento da Força de Trabalho diante da Reconstrução da Vigilância à Saúde da Subsecretaria de Estado da Saúde do Distrito Federal. In: Ministério da Saúde. Prêmio InovaSUS: valorização de boas práticas e inovação na gestão do trabalho na saúde. Brasília, DF: Ministério da Saúde; 2013. p. 55-63.

25. Possa LB, Gosch CS, Ferla AA. Planejamento e dimensionamento da força de trabalho: uma ferramenta-dispositivo para a gestão do trabalho e da educação da saúde. In: Possa LB, Trepte RF, Gosch CS, et al. Dimensionamento da força de trabalho em saúde: gestão em ato e territórios em diálogo. 1. ed. Porto Alegre: Rede Unida; 2020. p. 32-53.

26. Cruz AM, Oliveira MIR. Estudo para redimensionamento de Auxiliares Administrativos nas Unidades Básicas de Saúde da Secretaria Municipal de Saúde de Belo Horizonte. In: Ministério da Saúde. Prêmio InovaSUS: valorização de boas práticas e inovação na gestão do trabalho na saúde. Brasília, DF: Ministério da Saúde; 2013. p. 81-87.

27. Pereira DAO, Diniz CA, Aquino PF, et al. Dimensionamento da força de trabalho administrativa: aplicação do método em duas unidades da gestão federal do SUS. In: Anais da 1ª conferência Internacional de Inovação Tecnológica em Saúde; 2017 Ago 21-26; Natal. Rio Grande do Norte: SEDIS-UFRN; 2018. p. 332-9.

28. Ventin CD, Pereira DAO, Moraes IS. Dimensionamento de força de trabalho: a experiência inovadora do Ministério da Saúde. In: Cavalcanti P. Inovação e Políticas Públicas: Superando o Mito da Ideia. 1. ed. Brasília, DF: Instituto de Pesquisa Econômica Aplicada; 2019. p. 195-211.

29. Nascimento EPL, Carmona SAMLD. Experiência da elaboração do dimensionamento na atenção básica da Secretaria Municipal de Saúde de Campinas. In: Possa LB, Trepte RF, Gosch CS, et al. Dimensionamento da força de trabalho em saúde: gestão em ato e territórios em diálogo. 1. ed. Porto Alegre: Rede Unida; 2020. p. 127-34.

30. Rocha AS, Soares TCM, Silva FJS, et al. Dimensionamento da força de trabalho da Secretaria de Estado da Saúde Pública do Rio Grande do Norte. Est. debate. 2020; 27(3):7-19.

31. Nascimento CL, Nakamura HY. Fonoaudiologia no Sistema Único de Saúde do Estado de São Paulo. Distúrb Comun. 2018; 30(1):179-85.

32. Carvalho MN, Costa EMOD, Sakai MH, et al. Expansão e diversificação da força de trabalho de nível superior nas Unidades Básicas de Saúde no Brasil, 2008- 2013. Saúde debate. 2016; 109(40):154-62.

33. Ávila ABO, Carvalho DS, Medeiros JCD, et al. Dimensionamento da força de trabalho: análise histórica e comparada do Hospital Geral de Palmas/TO. In: Possa LB, Trepte RF, Gosch CS, et al. Dimensionamento da força de trabalho em saúde: gestão em ato e territórios em diálogo. 1. ed. Porto Alegre: Rede Unida; 2020. p. 97-110.

34. Carvalho MN, Gil CRR, Costa EMOD, et al. Necessidade e dinâmica da força de trabalho na Atenção Básica de Saúde no Brasil. Ciênc. Saúde Colet. 2018; 23(1):295-302.

35. Gil GP, Vituri DW, Haddad MCL, et al. Dimensionamento de pessoal de enfermagem e grau de dependência do paciente em um hospital universitário. Rev. Eletr. Enferm. 2011; 13(3):456-63.

36. Rogenski KE, Fugulin FMT, Gaidzinski RR, et al. Tempo de assistência de enfermagem em instituição hospitalar de ensino. Rev Esc Enferm USP. 2011; 45(1):223-9.

37. Zopi FC. Dimensionamento de pessoal de enfermagem na Atenção Básica em uma região de saúde. [dissertação]. Botucatu: Universidade Estadual Paulista Júlio de Mesquita Filho; 2016. 95 p.

38. Bonfim D. Planejamento da força de trabalho de enfermagem na Estratégia de Saúde da Família: indicadores de carga de trabalho. [tese]. São Paulo: Universidade de São Paulo; 2014. 404 p.

39. Silva MCN, Machado MH. Sistema de Saúde e Trabalho: desafios para a Enfermagem no Brasil. Ciênc. Saúde Colet. 2020; 25(1):07-13.

40. Matos SC, Cardoso SMM, Soares NV, et al. Dimensionamento do pessoal de enfermagem em uma unidade clínica. R. pesq.: cuid. fundam. 2012; 4(4):3052-9.

41. Alves MVMFF, Messora TCC, Gonçalves SPA, et al. Avaliação do grau de dependência de pacientes em enfermaria de ortopedia de um hospital escola. Rev. Eletr. Enferm. 2011; 13(4):612-9.

42. Perroca MG, Jericó MC, Calil ASG. Composição da equipe de enfermagem em Unidades de Terapia Intensiva. Acta Paul Enferm. 2011; 24(2):199-205.

43. Rossetti AC, Gaidzinski RR. Estimativa da equipe de enfermagem necessária em um novo hospital. Rev. Latino-Am. Enfermagem. 2011; 19(4):7.

44. Vituri DW, Lima SM, Kuwabara CCT, et al. Dimensionamento de enfermagem hospitalar: modelo OPAS/OMS. Texto Context. Enferm. 2011; 20(3):547-56.

45. Fugulin FMT, Rossetti AC, Ricardo CM, et al. Tempo de assistência de Enfermagem em Unidade de Terapia Intensiva: avaliação dos parâmetros propostos pela Resolução COFEN nº 293/04. Rev. Latino-Am. Enfermagem. 2012; 20(2):9.

46. Velozo KDS. Dimensionamento de pessoal de enfermagem utilizando os escores TISS-28 e NEMS em uma Unidade de Terapia Intensiva Pediátrica no sul do Brasil. [dissertação]. Porto Alegre: Pontifícia Universidade Católica do Rio Grande do Sul; 2012. 66 p.

47. Casarolli ACG, Eberhardt TD, Nicola AL, et al. Nível de complexidade assistencial e dimensionamento de enfermagem no pronto-socorro de um hospital público. Rev. Enferm. UFSM. 2015; 5(2):278-85.

48. Lorenzini E, Deckmann LR, Silva EF. Dimensionamento de pessoal de enfermagem em Centro Obstétrico. Rev. Enferm. UFSM. 2015; 5(3):661-68.

49. Costa JA. Método para dimensionamento de pessoal de enfermagem em Centro de Material e Esterilização (CME). [tese]. São Paulo: Universidade de São Paulo; 2015. 134 p.

50. Araújo MT, Henriques AVB, Velloso ISC, et al. Dimensionamento de pessoal de uma unidade de internação cirúrgica. Rev Gest Saúde. 2016; 7(2):650-69.

51. Borges F, Bohrer CD, Bugs TV, et al. Dimensionamento de pessoal de enfermagem na uti-adulto de hospital universitário público. Cogitare Enferm. 2017; 2(22):9.

52. Pedro DRC, Silva GKT, Schran LS, et al. Dimensionamento de pessoal de enfermagem no alojamento conjunto pediátrico de um hospital universitário. Rev Enferm UFPI. 2017; 6(3):4-10.

53. Teixeira FFR. Dimensionamento e carga de trabalho da enfermagem em UTI pediátrica e neonatal. [dissertação]. Curitiba: Universidade Federal do Paraná; 2017. 69 p.

54. Vasconcelos RO, Rigo DFH, Marques LGS, et al. Dimensionamento de pessoal de enfermagem hospitalar: estudo com parâmetros oficiais brasileiros de 2004 e 2017. Esc Anna Nery. 2017; 21(4):e20170098.

55. Velozo KDS, Garcia PCR, Piva JP, et al. Escores TISS-28 versus NEMS para dimensionar a equipe de enfermagem em unidade de terapia intensiva pediátrica. Einstein. 2017; 15(4):470-5.

56. Souza VS, Inoue KC, Oliveira JLC, et al. Dimensionamento do pessoal de enfermagem na terapia intensiva adulto. Rev. Min. Enferm. 2018; (22):6.

57. Pedro DRC, Oliveira JLC, Nelsi T, et al. Dimensionamento do pessoal de enfermagem em centro cirúrgico de um hospital universitário. J. Nurs. Health. 2018; 8(1):12.

58. Girardi SN, Carvalho CL, Araújo JF, et al. Mercado de Trabalho Médico: escassez e desigualdades na distribuição da Força de Trabalho no Brasil. Belo Horizonte: EPSM; 2013. 125 p.

59. Pierantoni CR, Magnago C. Oferta e Necessidades de Recursos Humanos em Saúde. Montevidéo: Observatório Mercosul; 2015. 175 p.

60. Nascimento CL. Histórias da inserção da fonoaudiologia no Sistema Único de Saúde: encontros das águas. [tese]. Campinas: Universidade Estadual de Campinas; 2020. 224 p.

61. Machado CR. Dimensionamento da carga de trabalho em unidade de alta complexidade em traumatologia e ortopedia. [tese]. Rio de Janeiro: Universidade do Estado do Rio de Janeiro; 2015. 122 p.

62. Martins EMLR. A necessidade de médicos especialistas em Ginecologia/Obstetrícia para o Sistema Único de Saúde - SUS no estado de Pernambuco. [dissertação]. Recife: Universidade Federal de Pernambuco; 2016. 98 p.

63. Matsumoto KS. Parâmetros para dimensionamento de médicos na Estratégia de Saúde da Família. [tese]. Rio de Janeiro: Universidade do Estado do Rio de Janeiro; 2018. 147 p.

64. Pierantoni CR, Varella TC, Santos MR, et al. Indicadores de Carga de Trabalho para Profissionais da Estratégia Saúde da Familia. In: Pierantoni CR, Dal Poz MR, França T. O Trabalho em Saúde: Abordagens Quantitativas e Qualitativas. 1 ed. Rio de Janeiro: CEPESC; 2011. p. 55-68.

65. Pierantoni CR. Componente 3: Estimativa da Necessidade de Recursos Humanos em Saúde na Atenção Primária do Sistema Único de Saúde. In: Pierantoni CR. Fortalecimento da capacidade de planejamento de recursos humanos para Sistemas Nacionais de Saúde. Belo Horizonte: EPSM; 2013. p. 602-956

66. Silva GGV. Comportamento das escalas de plantão das clínicas médica e pediátrica dos serviços de pronto atendimento da rede de saúde do município do Recife no período de agosto de 2009 a julho de 2010. [monografia]. Recife: Fundação Oswaldo Cruz; 2011. 47 p.

67. Brasil. Ministério da Saúde. Resolução nº 287, de 08 de outubro de 1998. Relaciona as categorias profissionais de saúde de nível superior para fins de atuação do Conselho Nacional de Saúde. Diário Oficial da União. 8 Out 1998.

68. Peduzzi M, Agreli HLF, Silva JAM, et al. Trabalho em equipe: uma revisita ao conceito e a seus desdobramentos no trabalho interprofissional. Trab. Educ. Saúde. 2020; 18(s1):e0024678 .

69. Ávila ABO, Carvalho DS, Medeiros JCD, et al. Força de trabalho e indicadores hospitalares: análise comparada de duas unidades estaduais do Tocantins. In: Possa LB, Trepte RF, Gosch CS, et al. Dimensionamento da força de trabalho em saúde: gestão em ato e territórios em diálogo. 1. ed. Porto Alegre: Rede Unida; 2020. p. 111-26.

70. Silva AP. Dimensionamento de pessoal para cuidados paliativos em uma instituição complexa de oncologia. [tese]. Rio de Janeiro: Universidade do Estado do Rio de Janeiro; 2020. 254 p.

71. Carvalho DS, Nascimento EPL. Dimensionamento da força de trabalho para saúde do município de Fortaleza - CE: relatório técnico. Brasília, DF: Ministério da Saúde; 2020. 170 p.

72. Guimarães ACHB, Baptista EKK, Rodrigues ES, et al. Fortalecimento da gestão do trabalho na atenção básica: dimensionamento da força de trabalho em Maringá-PR. In: Possa LB, Trepte RF, Gosch CS, et al. Dimensionamento da força de trabalho em saúde: gestão em ato e territórios em diálogo. 1. ed. Porto Alegre: Rede Unida; 2020. p. 135-56.

73. Marques AMP, Goulart FAA, Castro JL. Dimensionamento de Recursos Humanos na Atenção Básica - A experiência da Secretaria Municipal de Campinas (SP). In: Marques AMP, Goulart FAA, Castro JL. Gestão do trabalho em saúde: experiências selecionadas do prêmio InovaSUS – Laboratório de Inovação. Brasília, DF: OPAS/OMS. 2016. p. 161-80.

74. Oliveira EF. Proposta de modelo para o dimensionamento do quadro de profissionais para o serviço de Engenharia Clínica dos hospitais universitários da Universidade Federal do Ceará. [dissertação]. Campina Grande: Universidade Estadual da Paraíba; 2018. 134 p.

75. Ávila ABO, Carvalho DS, Mascarenhas LVR, et al. O processo de planejar e dimensionar a força de trabalho em hospitais do SUS: a experiência de uma formação-intervenção na Secretaria de Estado da Saúde do Tocantins. In: Possa LB, Trepte RF, Gosch CS, et al. Dimensionamento da força de trabalho em saúde: gestão em ato e territórios em diálogo. 1. ed. Porto Alegre: Rede Unida; 2020. p. 87-96.

76. Cruz AFB, Alves A, Menezes A, et al. Dimensionamento da Força de Trabalho nas Unidades Assistenciais da Rede Própria da Secretaria da Saúde do Estado da Bahia – Sesab. In: Ministério da Saúde. Prêmio InovaSUS: valorização de boas práticas e inovação na gestão do trabalho na saúde. Brasília, DF: Ministério da Saúde; 2013. p. 117-23.

77. Marques MFT, Torres MJF. Dimensionamento de Pessoas para a Secretaria de Estado da Saúde Pública do Rio Grande do Norte. In: Ministério da Saúde. Prêmio InovaSUS: valorização de boas práticas e inovação na gestão do trabalho na saúde. Brasília, DF: Ministério da Saúde; 2013. p. 45-53.

78. Monteiro JLS, Dal Poz MR, Meireles GA, et al. Análise dos métodos de avaliação da carga de trabalho de recursos humanos em saúde: revisão integrativa da literatura. Res. Soc. Dev. 2021; 10(2):e39010212400 .

79. Carvalho DS, Souza CEA, Souza GH. A força de trabalho e a relação de profissionais por leito dos hospitais públicos no município de Fortaleza. Rev. Gest. Sist. Saúde. 2021; 10(2):157-79.

80. Possa LB, Trepte RF, Plentz LM, et al. Planejamento da força de trabalho como tradução de imagens sobre o trabalho: teorias, conceitos e movimentos. In: Possa LB, Trepte RF, Gosch CS, et al. Dimensionamento da força de trabalho em saúde: gestão em ato e territórios em diálogo. 1. ed. Porto Alegre: Rede Unida; 2020. p. 17-31.

81. Ramos LB, Possa LB. Dimensionamento da força de trabalho no SUS: o trabalho (e o trabalhador) vivo no planejamento do cuidado em saúde. Saúde Redes. Porto Alegre. 2016; 2(1):43-52.

82. Ayres JRCM. Organização das ações de atenção à saúde: modelos e práticas. Saúde Soc. 2009; 18(s2):11-23.

83. Carvalho DS, Nascimento EPL. DimeRede: desenvolvimento de uma proposta de metodologia para o planejamento e dimensionamento da força de trabalho em saúde. Saúde Colet. (Barueri). 2021; 11(62):5097-115.

84. Schraiber LB, Vilasbôas ALQ, Nemes MIB. Programação em Saúde e Organização das Práticas: Possibilidades de Integração entre Ações Individuais e Coletivas no Sistema Único de Saúde. In: Paim J, Almeida-filho N. Saúde Coletiva: Teoria e Prática. Rio de Janeiro: Medbook; 2014. p. 83-93.

85. Ponte HMS, Oliveira LC, Ávila MMM. Desafios da operacionalização do Método da Roda: experiência em Sobral (CE). Saúde debate. 2016; 40(108):34-47.

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