REVISTA BRASILEIRA DE MEDICINA DE FAMÍLIA E COMUNIDADE
RBMFC

www.rbmfc.org.br
ISSN 2179-7994

Research Article

Recognition and Management of Work-Related Musculoskeletal Disorders by Family Practice Residents

Reconhecimento e abordagem dos Distúrbios Osteomusculares Relacionados ao Trabalho (DORT) por residentes de Medicina de Família e Comunidade

Reconocimiento y Manejo de los Trastornos Musculoesqueléticos (TME) Relacionados con el Trabajo por Residentes de Medicina Familiar

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Abstract

Introduction: Occupational Health (OH) is an essential component of public health in Brazil, with Primary Health Care (PHC) serves as the main entry point for work-related demands. Family Practice (FP), a medical specialty inherently aligned with PHC, includes OH as a core competency. However, the management of Work-Related Musculoskeletal Disorders (WRMDs), which are highly prevalent and impactful, faces challenges such as systemic underreporting and partial approaches to care. **Objective:** To assess the knowledge and management practices of FP residents regarding WRMDs, with emphasis on non-pharmacological interventions and on handling patient care pathways within the National Network for Comprehensive Occupational Health Care (*Rede Nacional de Atenção Integral à Saúde do Trabalhador* – RENAST), and to investigate potential associations with the medical residency period. **Methods:** A cross-sectional study was conducted with residents enrolled in an FP residency program in São Paulo (SP, Brazil) (n=17), using a self-administered electronic questionnaire (by REDCap) comprising 22 questions divided into five sections. Descriptive analyses and non-parametric tests (Fisher's exact test and Kruskal–Wallis test) were performed to evaluate associations with the residency stage. **Results:** The response rate was 40.5%. Most participants identified as cisgender women and were in the intermediate stage of residency. Nearly all residents (94.1%) had cared for patients with work-related complaints, and 70.6% had diagnosed WRMDs in the previous 12 months. Investigation of current or past occupation was inconsistent, although assessment of aggravating and relieving factors was frequent. Recognition of the distinction between the terms repetitive strain injury (RSI) and WRMD, as well as the frequency of diagnosis, were significantly associated with residency stage ($p<0.05$). Fewer than half of the residents (47.1%) were aware of the mandatory requirement to report WMSDs through the Notifiable Diseases Information System (*Sistema de Informação de Agravos de Notificação* – SINAN). Referral to the Occupational Health Reference Centers (*Centros de Referência em Saúde do Trabalhador* – CEREST/CRST) was reported by 41.2% of participants. **Conclusions:** FP residents are exposed to and develop conceptual and diagnostic competencies related to WRMDs; however, they exhibit substantial gaps regarding compulsory reporting of these conditions through SINAN, a competency that was not associated with the length of training.

Keywords: Musculoskeletal diseases; Cumulative trauma disorders; Family Practice; Education, Medical.

Corresponding author:
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E-mail: mats.srib@gmail.com
Funding:
No external funding.
Ethical approval:
7.294.391
Informed Consent:
yes.
Provenance:
Not commissioned.
Peer review:
external.
Received: 05/25/2025.
Approved: 09/02/2025
Associated Editor:
Bruno Pereira Stelet

How to cite: Ribeiro MS, Souza GCM, Cassenote AJF, Sartor SG. Recognition and Management of Work-Related Musculoskeletal Disorders by Family Practice Residents. Rev Bras Med Fam Comunidade. 2025;20(47):4791. https://doi.org/10.5712/rbmfc20(47)4791

Resumo

Introdução: A Saúde do Trabalhador (ST) é um componente essencial da saúde pública no Brasil, sendo a Atenção Primária à Saúde (APS) a porta de entrada para demandas ocupacionais. A Medicina de Família e Comunidade (MFC), especialidade vocacionada para APS, tem a ST como área de competência fundamental, mas a abordagem dos Distúrbios Osteomusculares Relacionados ao Trabalho (DORT), muito prevalentes e impactantes, enfrenta desafios como a subnotificação sistêmica e a abordagem parcial. **Objetivo:** Avaliar o conhecimento e a abordagem dos residentes de MFC sobre DORT, com foco nas condutas não farmacológicas e no manejo do fluxo de pacientes na Rede Nacional de Atenção Integral à Saúde do Trabalhador (RENAST), além de investigar possíveis associações com o período da residência médica. **Métodos:** Realizou-se um estudo transversal com residentes de um programa de MFC em São Paulo (SP, Brasil) (n=17), mediante a utilização de questionário eletrônico autoaplicável (via Research Electronic Data Capture — REDCap) com 22 perguntas divididas em cinco seções. Foram realizadas análises descritivas e testes não paramétricos (Exato de Fisher e Kruskal-Wallis) para avaliar associações com o período cursado no programa de residência. **Resultados:** A taxa de participação foi de 40,5%. A maioria dos participantes identificava-se como mulher cisgênero e cursava o período intermediário da residência médica. Quase todos (94,1%) atenderam pacientes com queixas ligadas ao trabalho, e 70,6% diagnosticaram DORT nos últimos 12 meses. A investigação sobre ocupação atual/anterior foi inconsistente, mas a avaliação de fatores de melhora/piora foi frequente. O reconhecimento da diferença entre os termos LER e DORT e a frequência de diagnóstico associaram-se significativamente ao tempo de residência ($p<0,05$). Menos da metade (47,1%) sabia da obrigatoriedade de notificação dos DORT via Sistema de Informação de Agravos de Notificação (SINAN). O encaminhamento aos Centros de Referência em Saúde do Trabalhador (CEREST/CRST) ocorreu em 41,2% dos casos. **Conclusões:** Residentes de MFC têm contato e desenvolvem capacidade conceitual e diagnóstica para DORT, mas demonstram lacunas significativas no que tange à notificação compulsória desse quadro via SINAN, competência que não se associou ao tempo de formação.

Palavras-chave: Doenças musculoesqueléticas; Transtornos traumáticos cumulativos; Medicina de Família e Comunidade; Educação médica.

Resumen

Introducción: La Salud del Trabajador (ST) es un componente esencial de la salud pública en Brasil, siendo la Atención Primaria de Salud (APS) la puerta de entrada para las demandas relacionadas con el trabajo. La Medicina Familiar y Comunitaria (MFC), especialidad orientada a la APS, considera la ST como un área de competencia central. Sin embargo, el abordaje de los Trastornos Musculoesqueléticos Relacionados con el Trabajo (TME-RT), muy prevalentes y de gran impacto, enfrenta desafíos como la subnotificación sistémica y un manejo parcial. **Objetivo:** Evaluar el conocimiento y el manejo de los residentes de MFC sobre los TME-RT, con enfoque en las estrategias no farmacológicas y en el manejo del flujo de pacientes en la Red Nacional de Atención Integral a la Salud del Trabajador (RENAST), además de investigar posibles asociaciones con el período de la residencia médica. **Métodos:** Se realizó un estudio transversal con residentes de un programa de MFC en São Paulo (SP, Brasil) (n=17), mediante un cuestionario electrónico autoadministrado (vía REDCap) con 22 preguntas dividido en cinco secciones. Se realizaron análisis descriptivos y pruebas no paramétricas (Prueba Exacta de Fisher y Kruskal-Wallis) para evaluar asociaciones con el período del programa de residencia. **Resultados:** La tasa de respuesta fue del 40,5%. La mayoría de los participantes se identificaron como mujeres cisgénero y cursaban el período intermedio de la residencia médica. Casi todos (94,1%) reportaron haber atendido pacientes con quejas relacionadas con el trabajo y el 70,6% diagnosticaron TME-RT en los últimos 12 meses. La investigación sobre la ocupación actual/anterior fue inconsistente, pero la evaluación de factores de mejoría/empeoramiento fue frecuente. El reconocimiento de la diferencia entre los términos Lesión por Esfuerzo Repetitivo (LER) y TME-RT, y la frecuencia diagnóstica, se asociaron significativamente con el período en el programa de residencia ($p<0,05$). Menos de la mitad (47,1%) conocía la obligatoriedad de notificar los TME-RT a través del Sistema de Información de Agravios de Notificación (SINAN). La derivación al Centro de Referencia en Salud del Trabajador (CEREST/CRST) se realizó en el 41,2% de los casos. **Conclusiones:** Los residentes de MFC entran en contacto y desarrollan capacidad conceptual y diagnóstica para los TME-RT, pero demuestran lagunas significativas en lo que respecta a la notificación obligatoria de este cuadro vía SINAN, una competencia que no se asoció con el tiempo de formación.

Palabras clave: Enfermedades musculoesqueléticas; Trastornos de traumas acumulados; Medicina Familiar y Comunitaria; Educación médica.

INTRODUCTION

The relationship between health and work permeates the social and economic fabric, establishing occupational health (OH) as a strategic and integral field of public health in Brazil.[1] The Brazilian Unified Health System (*Sistema Único de Saúde* – SUS), grounded in the constitutional principles of 1988 and the Organic Health Law, holds primary responsibility for actions related to the surveillance, promotion, protection, recovery, and rehabilitation of Brazilian workers' health.[2,3] To operationalize this mandate, the National Policy on Workers' Health (*Política Nacional de Saúde do Trabalhador e da Trabalhadora* – PNSTT) was established, defining guidelines for comprehensive occupational health care with an emphasis on surveillance and intervention in the determinants of the health-disease-care process arising

from production models.[4] As an organizational strategy to implement the PNSTT within the Health Care Network (*Rede de Atenção à Saúde* – RAS), the National Network for Comprehensive Workers' Health Care (*Rede Nacional de Atenção Integral à Saúde do Trabalhador* – RENAST) coordinates the various levels of care, supported by the Reference Centers for Workers' Health (*Centros de Referência em Saúde do Trabalhador* – CEREST/CRST), which serve as specialized support units.[5-7] Within this framework, Primary Health Care (PHC), particularly through the Family Health Strategy (FHS) — the country's main PHC model — functions as the preferred entry point and care coordinator, often representing the worker's first contact with the health system and playing a key role in the identification and initial management of work-related health demands.[1,4,8]

Given the magnitude of the Brazilian workforce, projected to exceed 100 million employed individuals in 2025 (according to the Continuous National Household Sample Survey — *Pesquisa Nacional por Amostra de Domicílios Contínua* – PNAD Contínua), the training of professionals working in PHC becomes a cornerstone for the effectiveness of RENAST.[9,10] Family Practice (FP), a medical specialty focused on PHC, includes "worker health care" as a core area in its competency matrix, as established by the National Medical Residency Commission (*Comissão Nacional de Residência Médica* – CNRM).[11] FP residents are expected to develop the skills necessary to recognize the impacts of working conditions on health, manage the most common problems, establish causal relationships, provide guidance regarding work absences, and, critically, perform mandatory notifications.[11,12] The Entrustable Professional Activities (EPAs) in FP, which define the essential activities of the specialty — structured and validated by the Brazilian Society of Family and Community Medicine (*Sociedade Brasileira de Medicina de Família e Comunidade* – SBMFC), reinforce this expectation, integrating attention to worker health into the scope of medical practice anticipated upon completion of training.[13]

Within this primary health care context, one of the most frequent work-related demands comprises work-related musculoskeletal disorders (WRMDs), previously referred to as repetitive strain injuries (RSIs).[1,14] These conditions encompass a range of nosological entities affecting the musculoskeletal system, such as arthralgia and myalgia, resulting from biomechanical overload imposed by certain work activities — typically repetitive — and constitute a significant cause of pain, suffering, and disability.[1,15] Symptoms including pain, paresthesia, and sensations of heaviness or fatigue, particularly in the upper limbs, should prompt the professional to investigate the patient's occupational history, as diagnosis is predominantly clinical-occupational, based on anamnesis and physical examination.[1,15] Although most cases can improve favorably with appropriate treatment, diagnostic confirmation of WRMDs necessitates mandatory notification through the Notifiable Diseases Information System (*Sistema de Informação de Agravos de Notificação* – SINAN).[15,16] Moreover, for workers covered by the National Social Security Institute (*Instituto Nacional do Seguro Social* – INSS), if the employer fails to do so, the physician may issue the Work Accident Report (*Comunicação de Acidente de Trabalho* – CAT), ensuring access to social security and labor rights arising from the illness.[17,18]

However, despite its mandatory nature and epidemiological significance, the reporting of WRMD cases in SINAN faces a persistent challenge: underreporting.[16,19-23] Comparative studies with social security data and specific analyses indicate that only a small proportion of actual cases are recorded, with underreporting estimates potentially reaching thousands of cases.[19,20] This phenomenon is multifactorial, although its causes remain poorly understood. Factors such as the difficulty in establishing a causal link between the condition and work, insufficient training or workload of health professionals, resistance from

employers, and limitations and lack of integration in information systems all contribute to undermining data accuracy.[16,19,20] The consequences are substantial: distortion of the epidemiological profile obscures the true extent of the problem, the invisibility of work-related illness impedes the planning of effective surveillance and prevention measures, compromises resource allocation, and fundamentally creates barriers to workers' access to their rights.[24,25]

Given this complex scenario, in which primary health care and family and community physicians play a central role in both the identification and management of WRMSDs as well as in the reporting process, it is essential to examine the training and knowledge of these professionals. Accordingly, this study aimed to assess the knowledge of resident physicians in an FP program regarding WRMSDs, with particular emphasis on their approach — especially non-pharmacological treatments — and the management of patient flow within RENAST and the broader health system. Additionally, potential associations between the residents' responses and their stage in the medical residency program were explored.

METHODS

Study design and ethical considerations

A cross-sectional study was conducted with physicians enrolled in a Family Practice Residency Program (FPRP) in São Paulo. An electronic questionnaire, developed to evaluate knowledge of and approaches to work-related musculoskeletal disorders (WRMDs), was administered to these professionals.

All resident physicians with active enrollment in the FPRP were invited to participate. Participants were selected by convenience, with the final sample including all eligible residents who provided voluntary consent. The sole exclusion criterion was holding a specialist title, having completed a previous medical residency, or undertaking postgraduate studies (completed or in progress) in the field of Occupational Medicine. Recruitment was conducted through electronic invitations sent to the contacts provided by the program coordination.

Data collection began only after the project was approved by a Research Ethics Committee (CAAE: 84842724.3.3001.0066). Participation was strictly voluntary and took place between February and April 2025. Prior to accessing the questionnaire, implemented on the Research Electronic Data Capture (REDCap) platform — a secure tool for collecting and managing research data — potential participants were presented with an introductory text detailing the invitation, the study objectives, the inclusion and exclusion procedures and criteria, the minimal risks (limited to possible discomfort when answering about unfamiliar topics, with the non-evaluative nature of the study being emphasized), and the indirect benefits of the research.[26,27] The Informed Consent (IC) was presented in full. Proceeding to the questionnaire was conditional upon explicit acceptance of the IC terms on the platform (equivalent to a signature), and the participant was required to obtain an electronic copy of the document, in accordance with the guidelines of the National Research Ethics Committee (*Comissão Nacional de Ética em Pesquisa* – CONEP).[28,29] All collected data were anonymized at the source. As stipulated in the IC approved by the Ethics Committee, the raw data will not be shared publicly in a non-aggregated form due to the lack of provision for this possibility; however, they may be requested for analysis by consulting the responsible Ethics Committee.

Data collection instrument

The instrument employed was a structured questionnaire consisting of 22 closed-ended questions, specifically developed by the authors to address the objectives of this study. The questionnaire was organized into five thematic sections: (A) sample characterization (five questions), including year of birth, self-identified gender, and educational trajectory (year of graduation, year of entry into, and expected year of completion of the medical residency). The remaining sections assessed specific domains related to WRMDs: (B) identification (five questions), (C) concept (four questions), (D) non-pharmacological management (five questions), and (E) notification (three questions). These sections were designed to examine aspects such as the collection of information relevant to diagnosis, follow-up planning and health education, knowledge regarding the requirement to report cases via SINAN, and the practice of issuing the CAT.

The complete questionnaire used in this study is publicly accessible in an open research repository, ensuring transparency and availability of the instrument for at least ten years (as guaranteed by the repository provider).[30]

Statistical analysis

The data collected were exported from REDCap, organized into a database, and analyzed using IBM SPSS Statistics®, version 27.

Initially, a descriptive analysis of the variables was conducted to characterize the sample and summarize responses regarding knowledge, identification, and management of WRMDs. Categorical variables (nominal and ordinal), including sociodemographic characteristics and responses to sections B, C, D, and E of the questionnaire, were presented as absolute and relative frequencies. Continuous quantitative variables (age, time since graduation, etc.) were described using means and standard deviations (SD).

To investigate associations between the stage of study in the FPRP (categorical independent variable defined as “Initial Period,” “Intermediate Period,” and “Final Period,” based on the year of entry and expected completion of the residency) and the dependent variables related to knowledge and practices regarding WRMDs, non-parametric hypothesis tests were applied, suitable for the sample size and the predominantly ordinal nature of the data. For nominal dependent variables, Fisher’s Exact test was employed, preferred over Pearson’s chi-square test due to expected counts below 5 in more than 20% of cells in the contingency tables, a common occurrence in small samples. Two-sided exact p-values were reported. The strength of significant associations identified by Fisher’s Exact test was assessed using Cramer’s V coefficient. For ordinal dependent variables (Likert-type scales), the Kruskal-Wallis test was used to compare response distributions among the three FPRP groups according to residency stage, with bilateral asymptotic p-values reported. Dependent variables showing no variability in responses among participants were excluded from the association analyses.

RESULTS

The questionnaire received 17 valid responses, corresponding to a participation rate of 40.5% among eligible resident physicians. Participation varied according to the stage of the FPRP, with a higher rate observed among residents in the final period of the program (62.5%) compared to those newly enrolled (22.2%).

The sample profile (Table 1) showed a predominance of participants who self-identified as cisgender women (70.6%) and who were in the intermediate period of the medical residency (47.1%), corresponding to progression from the first (R1) to the second year (R2) of the FPRP. The mean age of respondents was 29.76 years (SD ±2.51). The average time since graduation from medical school was 2.82 years (SD ±1.74) at the time of data collection, while the mean interval between graduation and the start of medical residency was 1.76 years (SD ±1.75).

Table 1. Sample characteristics (n=17).

	n	%
Gender		
Cisgender woman	12	70.6
Cisgender man	4	23.5
Non-binary	1	5.9
Total	**17**	**100**
FPRP period		
Initial period*	4	23.5
Intermediate period**	8	47.1
Final period***	5	29.4
Total	**17**	**100**

*Beginning of R1; **Completing R1 and beginning R2; *** Completing R2.

Regarding practices for identifying WRMDs during consultations (Table 2), most residents reported asking about patients' current and previous professions or occupations (76.5% for both) and about the potential relationship between the complaints and work (82.4% answered "yes, always" or "yes, but not always"). Investigating factors that alleviate or exacerbate the complaints was reported as a routine practice by 64.7% of participants. Nearly the entire sample (94.1%) stated that they had seen at least one patient with work-related complaints in the previous 12 months.

Regarding conceptual knowledge (Table 3), all participants reported familiarity with the terms "WRMD" and "RSI." The majority (70.6%) recognized a conceptual distinction between the two acronyms. The same proportion (70.6%) of residents indicated that they had diagnosed at least one case of RSI/WRMD in the 12 months preceding data collection.

Regarding non-pharmacological management, 58.8% of residents considered it "always" necessary to refer patients with WRMDs for concurrent care by a multidisciplinary team (social workers, physiotherapists, occupational therapists, etc.).

Regarding management (Table 4), 41.2% of residents reported "always" advising patients to take breaks or perform stretching exercises and maintain proper posture at work, while 29.4% provided this guidance "but not always." The recommendation of regular physical exercise as a general health measure was indicated as "always" by 88.2% of participants and "not always" by 11.8%.

Regarding guidance on resources outside the health unit, only 35.3% of residents reported "always" advising patients to consult the Occupational Medicine team at their companies, a frequency equal to that of those who did so "sometimes." Concerning referrals to the CEREST/CRST, 47.1% of participants had not made any referrals in the past 12 months, while 41.2% had.

Table 2. Responses to the domain on identification (section B).

	n	%	95%CI	
During consultations, do you usually ask the patient about their current profession or occupation?				
Yes, but not always	7	41.2	20.7	64.4
Yes, always	6	35.3	16.3	58.9
Sometimes	3	17.7	5.2	40.0
No, almost never	1	5.9	0.6	24.4
No, never	0	0.0	-	-
Total	**17**	**100**	**-**	**-**
During consultations, do you usually ask the patient about their previous profession or occupation?				
Yes, but not always	8	47.1	25.4	69.7
No, almost never	5	29.4	12.2	53.0
Sometimes	2	11.8	2.5	32.7
Yes, always	2	11.8	2.5	32.7
No, never	0	0.0	-	-
Total	**17**	**100**	**-**	**-**
During consultations, do you usually ask the patient about factors that improve or worsen their complaints?				
Yes, always	11	64.7	41.1	83.7
Yes, but not always	6	35.3	16.3	58.9
No, never	0	0.0	-	-
No, almost never	0	0.0	-	-
Sometimes	0	0.0	-	-
Total	**17**	**100**	**-**	**-**
During consultations, do you usually ask the patient whether their reported complaints are related to their current or previous occupation?				
Yes, but not always	7	41.2	20.7	64.4
Yes, always	7	41.2	20.7	64.4
Sometimes	3	17.7	5.2	40.0
No, never	0	0.0	-	-
No, almost never	0	0.0	-	-
Total	**17**	**100**	**-**	**-**
In the past 12 months, have you assisted any patient who sought medical care for work-related complaints?				
Yes	16	94.1	75.6	99.4
I don't remember	1	5.9	0.6	24.4
No	0	0.0	-	-
Total	**17**	**100**	**-**	**-**

Note: Response options are listed according to the number of responses recorded for each question.
Totals may not add up to 100% due to rounding; 95%CI: 95% confidence interval.

In the area of notification (Table 5), fewer than half of the residents (47.1%) demonstrated knowledge of the obligation to report cases of RSI/WRMD to the Ministry of Health and/or local Health Departments. Consequently, only one participant (5.9%) reported having submitted or requested the notification of a case in the past 12 months. The issuance of CAT for cases of RSI/WRMD was carried out or requested by two residents (11.8%) during the same period.

Table 3. Responses to the domain on concept (section C).

	n	%	95%CI	
Have you ever heard of work-related musculoskeletal disorders (WRMD)?				
Yes	17	100	-	-
No	0	0.0	-	-
I don't remember	0	0.0	-	-
Total	**17**	**100**	**-**	**-**
Have you ever heard of repetitive strain injury (RSI)?				
Yes	17	100	-	-
No	0	0.0	-	-
I don't remember	0	0.0	-	-
Total	**17**	**100**	**-**	**-**
Is there a difference between the terms RSI and WRMD?				
Yes	12	70.6	47.0	87.8
No	3	17.7	5.2	40.0
I don't remember	2	11.8	2.5	32.7
Total	**17**	**100**	**-**	**-**
In the past 12 months, have you diagnosed any cases of RSI/WRMD?				
Yes	12	70.6	47.0	87.8
No	3	17.7	5.2	40.0
I don't remember	2	11.8	2.5	32.7
Total	**17**	**100**	**-**	**-**

Totals may not add up to 100% due to rounding; 95%CI: 95% confidence interval.

Association tests (Table 6) were conducted between the stage of the FPRP (initial, intermediate, and final) and variables related to knowledge and management of WRMDs. Of these, only two variables showed statistically significant associations with the residency stage: the perception of a distinction between RSI and WRMDs (p=0.027) and the reporting of diagnosed RSI/WRMD cases in the past 12 months (p=0.019).

The associations identified had Cramer's V coefficients of 0.481 and 0.555, respectively, indicating that residents in the intermediate stage of the program were more likely to recognize the distinction between the terms and to report diagnosing cases, whereas residents at the beginning of the program were more likely not to recognize the distinction or to report not having diagnosed any cases recently.

DISCUSSION

This cross-sectional study aimed to evaluate the knowledge and practices of FP residents regarding WRMDs within a medical residency program in São Paulo. The findings highlight a relevant scenario: although resident physicians frequently encounter work-related complaints and demonstrate increasing ability to diagnose and conceptually differentiate WRMDs throughout their training, substantial gaps remain, particularly concerning the mandatory reporting of cases. This deficiency at the final stage of the care pathway may contribute to the well-documented phenomenon of underreporting and negatively affect the provision of care to workers in PHC.

Investigating occupational history is a fundamental step in addressing WRMDs.[1,15] Our findings indicate that, although most resident physicians inquire about patients' current and previous professions

Table 4. Responses to the domain on non-pharmacological management (section D).

	n	%	95%CI	
When a patient is diagnosed with RSI or WRMD, do you believe it is necessary to refer them for simultaneous care with a multiprofessional team?				
Yes, always	10	58.8	35.6	79.3
Yes, but not always	7	41.2	20.7	64.4
No, never	0	0.0	-	-
No, almost never	0	0.0	-	-
Sometimes	0	0.0	-	-
Total	**17**	**100**	**-**	**-**
Do you usually advise patients to take breaks or stretch during the workday and to maintain proper physical posture?				
Yes, always	7	41.2	20.7	64.4
Yes, but not always	5	29.4	12.2	53.0
Sometimes	4	23.5	8.5	46.7
No, almost never	1	5.9	0.6	24.4
No, never	0	0.0	-	-
Total	**17**	**100**	**-**	**-**
Do you regularly recommend physical exercise to your patients as part of health promotion guidance?				
Yes, always	15	88.2	67.3	97.5
Yes, but not always	2	11.8	2.5	32.7
No, never	0	0.0	-	-
No, almost never	0	0.0	-	-
Sometimes	0	0.0	-	-
Total	**17**	**100**	**-**	**-**
Do you usually advise patients to seek the Occupational Medicine team at their respective workplaces?				
Sometimes	6	35.3	16.3	58.9
Yes, always	6	35.3	16.3	58.9
No, never	2	11.8	2.5	32.7
Yes, but not always	2	11.8	2.5	32.7
No, almost never	1	5.9	0.6	24.4
Total	**17**	**100**	**-**	**-**
In the past 12 months, have you referred any patient to the nearest Occupational Health Reference Center (CEREST/CRST)?				
No	8	47.1	25.4	69.7
Yes	7	41.2	20.7	64.4
I don't remember	2	11.8	2.5	32.7
Not necessary	0	0.0	-	-
Total	**17**	**100**	**-**	**-**

Note: Response options are listed according to the number of responses recorded for each question.
Totals may not add up to 100% due to rounding; 95%CI: 95% confidence interval.

Table 5. Responses to the domain on reporting (section E).

	n	%	95%CI	
When diagnosed, do RSI or WRMD need to be reported to the Ministry of Health and/or Health Departments?				
I don't know	9	52.9	30.3	74.6
Yes	8	47.1	25.4	69.7
Sometimes	0	0.0	-	-
No	0	0.0	-	-
Total	**17**	**100**	**-**	**-**
In the past 12 months, have you reported — or asked someone to report — any case of RSI/WRMD?				
No	12	70.6	47.0	87.8
I don't remember	4	23.5	8.5	46.7
Yes	1	5.9	0.6	24.4
Not necessary	0	0.0	-	-
Total	**17**	**100**	**-**	**-**
In the past 12 months, have you issued — or asked someone to issue — a Work Accident Report (*Comunicação de Acidente de Trabalho* – CAT) for any RSI/WRMD case?				
No	13	76.5	53.3	91.5
I don't remember	2	11.8	2.5	32.7
Yes	2	11.8	2.5	32.7
Not necessary	0	0.0	-	-
Total	**17**	**100**	**-**	**-**

Note: Response options are listed according to the number of responses recorded for each question.
Totals may not add up to 100% due to rounding; 95%CI: 95% confidence interval

Table 6. Association tests between different variables and the stage of the Family Prectice Residency Program.

	Test	p-value
Tests with Categorical Variables		
Care for patients with work-related complaints	Fisher's Exact	1.000
Knowledge about WRMD	*	-
Knowledge about RSI	*	-
Perception of differences between RSI and WRMD	Fisher's Exact	0.027
Diagnosis of RSI/WRMD cases (last 12 months)	Fisher's Exact	0.019
Referral to CEREST/CRST (last 12 months)	Fisher's Exact	0.712
Knowledge about the requirement for reporting	Fisher's Exact	1.000
Reporting RSI/WRMD cases (last 12 months)	Fisher's Exact	0.538
Issuing a CAT (last 12 months)	Fisher's Exact	0.416
Tests with Ordinal Variables		
Asking about current profession/occupation	Kruskal-Wallis	0.462
Asking about previous profession/occupation	Kruskal-Wallis	0.263
Asking about factors that worsen/improve complaints	Kruskal-Wallis	0.162
Asking about the relationship between complaints and occupation	Kruskal-Wallis	0.336
Belief that referral to a multidisciplinary team is necessary	Kruskal-Wallis	0.260
Advising breaks/stretching/posture at work	Kruskal-Wallis	0.603
Recommending physical exercise	Kruskal-Wallis	0.666
Advising to seek Occupational Medicine services in the workplace	Kruskal-Wallis	0.387

*Not applicable (all participants gave the same answer for this variable).

or occupations, this practice is not universal, with a substantial proportion performing it inconsistently. The literature emphasizes the importance of a detailed occupational history, not only for diagnosis but also to assess exposure to specific risks, such as heavy lifting, poor posture, vibration, or repetitive movements.[1,15,31] The inconsistency observed among residents may result from barriers such as time constraints due to patient load, the broad scope of topics to be addressed in PHC, or an underdeveloped perception of the relevance of these details for immediate management. This may lead to the omission of critical information necessary for establishing causality, implementing preventive measures, and formulating differential diagnostic hypotheses.[32,33]

Similarly, although assessing factors that alleviate or exacerbate complaints is essential for clinical reasoning in musculoskeletal conditions, only two-thirds of resident physicians conducted such assessments systematically — a notable inconsistency given the importance of this information for constructing a comprehensive occupational history.[1,15] Most residents also recognized the conceptual distinction between RSI and WRMD and reported diagnosing cases in the past 12 months, reflecting direct exposure to the problem and the development of both conceptual and diagnostic knowledge. Although the terms are often used interchangeably, they carry important implications in medical and legal contexts: “repetitive strain injury” implies the presence of identifiable musculoskeletal lesions — which may not always occur — and assumes that “repetitive strain” is the primary cause — without accounting for other occupational risk factors that can lead to WRMDs, such as static overload, poor posture, excessive force during tasks, and the use of tools that transmit vibration, etc.[31,34-36]

Notably, perception of the distinction between terms and the frequency of diagnoses were the only variables showing a significant association with residency stage, suggesting that clinical exposure and formal instruction during the program enhance these specific skills. Residents in the intermediate period of the program (progressing from R1 to R2) were more likely to recognize the distinction and report diagnoses, possibly reflecting a peak in learning or recent exposure to relevant modules. In contrast, residents in the final period more frequently reported “not remembering” diagnoses, which may indicate memory bias or reduced recent focus on the topic (amid numerous other learning demands at the end of training).

In non-pharmacological management, substantial adherence to general health recommendations was observed, including guidance on physical exercise and, to a lesser extent, on taking breaks and maintaining proper ergonomics at work. The reported need for referral to a multidisciplinary team reflects recognition of the importance of an interdisciplinary approach, although the effectiveness of such referrals may vary.[1,15,34,37] The low frequency of advice to consult the company’s Occupational Medicine team warrants consideration, as it may reflect limited knowledge of these services’ roles, perceived difficulties in accessing or coordinating with such professionals, skepticism regarding their effectiveness, or a perception that no further action is possible in these cases. Similarly, the referral rate to CEREST/CRST requires reflection, even though it appears proportionate when considering the problem-solving scope of PHC.

The most significant gap identified in this study pertains to knowledge and practices related to the mandatory reporting of WRMDs. Fewer than half of the residents (47.1%) reported awareness of the reporting requirement, and only one participant (5.9%) had actually reported a case in the past year — equating to one reported case for every 11 unreported cases (in this sample). The issuance of CAT was similarly low (11.8%). This finding warrants particular attention, as notification via SINAN is a crucial tool for epidemiological surveillance in occupational health, supporting the

planning of preventive measures and monitoring the workforce's health status.[16,19,20] The widespread underreporting of WRMDs in Brazil, documented in various studies, severely limits the visibility of the problem and the effectiveness of public policies.[16,19,20] Our results suggest that difficulties in consistently integrating the mandatory reporting process among physicians in PHC may constitute a relevant factor contributing to this systemic underreporting, representing an ongoing challenge for training programs.

The absence of a statistically significant association between time in the FPRP and knowledge of the reporting requirement or the practice of notification suggests an interesting interpretative possibility. Unlike conceptual and diagnostic knowledge, which appears to develop throughout the program, competencies related to surveillance and essential bureaucratic procedures may be more difficult to consolidate and implement effectively. Although occupational health training is included in the competency framework of FP, specific pedagogical strategies may be necessary to ensure adequate emphasis on these procedural and public health aspects, beyond diagnosis and individual patient care.

It is possible that theoretical knowledge about RSI/WRMD and diagnostic skills develop through clinical exposure and self-directed study (including during undergraduate training), whereas notification procedures and the workflow within RENAST, which are more procedural and aligned with public health functions, require explicit instruction, supervised practice, and continuous reinforcement. Ensuring these components consistently within already dense residency programs may be challenging. The study by Lynch et al. demonstrated that even primary care instructors may exhibit knowledge deficits in musculoskeletal complaints, and that confidence does not correlate with knowledge, whereas a greater volume of training is associated with increased knowledge.[38] Xu et al. reported that a specific curriculum improved residents' confidence and practice in musculoskeletal procedure–focused care.[39] These findings suggest that targeted educational interventions, such as notification simulations, structured discussions on RENAST workflows, and case analyses centered on surveillance, may strengthen the competencies identified as deficient in our study.

The literature on the knowledge or practice of FP physicians or residents regarding WRMDs and worker health is remarkably scarce. Although extensive research addresses the profile of affected workers, as well as interventions and care pathways, few studies explore how healthcare professionals at the point of care recognize, manage, and, critically, report WRMDs in their working patients.[40–44] Internationally, studies on occupational medicine training at the undergraduate level frequently highlight shortcomings; however, within the broader field of managing general musculoskeletal pain in PHC, the specific intersection between training, WRMD management, and reporting practices remains insufficiently examined. The study cited by the authors as pioneering the treatment of workers by family physicians in the United States dates back to 2006, underscoring the persistence of this gap.[39,45-47]

The importance of worker health in PHC is unquestionable, although (often) underestimated. As the gateway to SUS and coordinator of care, ESF, based on PHC and having the FP physician as the central figure, plays a strategic role in the early identification of work-related health problems, initial management, guidance on rights, appropriate referral within RENAST, and, fundamentally, in health surveillance through notification.[1] Any difficulty in fully performing any of these steps — something understandable given the multiplicity of tasks of the FP specialist — compromises not only the individual care of the worker but also the health system's capacity to monitor risks and implement collective preventive actions.

This study presents limitations that should be considered. Firstly, the sample was a convenience sample, small in size, and composed of residents from a single FPRP in São Paulo, which limits the generalizability of the results to other contexts or regions of Brazil (as evidenced by the wide confidence interval mentioned). The response rate of 40.5% can be considered low and may introduce selection bias (as in any similar study) since residents with greater interest in the topic may have been more inclined to participate. Additionally, the study relied on self-reported responses, which may not accurately reflect actual clinical practice due to social desirability or memory bias. No objective knowledge assessments, direct observations of practice, or analyses of medical records were conducted. Future research should address these issues in larger and more diverse samples of residents, using mixed methods that incorporate objective assessments and qualitative approaches to deepen the understanding of barriers perceived by professionals. Despite these limitations, the findings offer a valuable starting point for reflection on training and practice in occupational health within FP.

CONCLUSION

Although residents demonstrate contact with work-related complaints and develop diagnostic and conceptual skills regarding WRMDs throughout their training, significant gaps persist in the evaluated group. These deficiencies may involve the consistent application of occupational history taking, the full utilization of available resources, such as referrals to Occupational Medicine teams, and knowledge of the mandatory nature and effective practice of compulsory case reporting. Further studies are needed to determine whether the perceived gaps correspond to daily clinical practice.

CONFLICT OF INTERESTS

Nothing to declare.

AUTHORS' CONTRIBUTIONS

MSR: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Writing – Original Draft. GCMS: Data Curation, Formal Analysis, Investigation, Writing – Original Draft. AJFC: Data Curation, Formal Analysis, Investigation, Validation, Writing – Review & Editing. SGS: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Validation, Writing – Review & Editing.

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