

Disability-adjusted life-years lost due to musculoskeletal disorders in oncology nursing professionals

Anos de vida perdidos ajustados pela incapacidade decorrentes de distúrbios musculoesqueléticos em profissionais de enfermagem oncológica

Años de vida perdidos ajustados por discapacidad por trastornos musculoesqueléticos en profesionales de enfermería oncológica

Abstract

Objectives: To estimate the disability-adjusted life-years (DALY) lost due to musculoskeletal disorders in nursing professionals in the hospital units of an oncological institution. **Methods:** Ecological study, using institutional database. Absolute values of DALY were transformed into rates per 100,000 inhabitants, and calculated by professional category, sex and age group. **Results:** It was estimated 3.78 DALY (2,136/100 thousand) among all nursing professionals; among nursing technicians 2.62 DALY (2186/100 thousand); and among nurses 1.15 DALY (2024/100 thousand). The largest DALY occurred among female nursing technicians, aged 50 to 59 years, whose value was 0.98 (3,161/100,000). Back diseases generated more DALY (1.97 DALY), especially low back pain and neck pain. Of the diagnoses found, 54% referred to Work-Related Musculoskeletal Diseases, and presented 2.62 DALY (69% of the total DALY). **Conclusion:** There was a large amount of DALY due to musculoskeletal diseases among the nursing professionals of the institution. **Keywords:** Nursing Staff; Musculoskeletal Diseases; Disability-Adjusted Life Years

Resumo

Objetivos: Estimar Anos de Vida Perdidos Ajustados pela Incapacidade - DALY decorrentes de distúrbios musculoesqueléticos em profissionais de enfermagem nas unidades hospitalares de uma instituição oncológica. **Métodos:** Estudo ecológico, utilizando banco de dados institucionais. Valores absolutos de DALY foram transformados em taxas por 100 mil habitantes, e calculadas por categoria profissional, sexo e faixa etária. **Resultados:** Estimouse 3,78 DALY (2.136/100 mil) entre todos os profissionais de enfermagem; entre Técnicos de enfermagem 2,62 DALY (2186//100 mil); e entre Enfermeiros 1,15 DALY (2024/100mil). Maior DALY ocorreu entre técnicos de enfermagem, sexo feminino, faixa etária de 50 a 59 anos, cujo valor é 0,98 (3.161/100mil). As Dorsopatias geraram mais DALY (1,97 DALY), destacando-se as lombalgias e cervicalgias. Dos diagnósticos encontrados, 54% referiam-se a Doenças Osteomusculares Relacionadas ao Trabalho, e apresentaram 2,62 DALY (69% do total de DALY). **Conclusão:** Houve uma grande quantidade de DALY decorrente de doenças musculoesqueléticas entre os profissionais de enfermagem da instituição.

Descritores: Equipe de Enfermagem; Doenças Musculoesqueléticas; Anos de Vida Ajustados pela Incapacidade

Resumen

Objetivos: Estimar los Años de Vida Ajustados en función de la Discapacidad (AVAD) derivada de los trastornos musculoesqueléticos entre los profesionales de enfermería en centros de una institución de oncología. **Métodos:** Estudio ecológico, basado en datos institucionales. Los valores absolutos de AVAD encontrados se transformaron en tasas por 100.000 habitantes, y se calcularon según categoría profesional, sexo y grupo de edad. **Resultados:** Se estimaron 3,78 AVAD (2.136/100.000) entre los profesionales de enfermería; 2,62 AVAD (2186/100.000) entre los técnicos de enfermería; y 1,15 AVAD (2.024/100.000) entre los enfermeros. El mayor AVAD ocurrió entre los técnicos de enfermería, del sexo femenino, de entre 50 y 59 años de edad, con el valor de 0,98 (3.161/100.000). Las dorsopatías generaron más AVAD (1,97 AVAD), especialmente lumbalgia y cervicalgia. El 54% de los diagnósticos se refieren a Enfermedades Musculoesqueléticas Relacionadas con el Trabajo, con 2,62 AVAD (69% del total de AVAD). **Conclusión:** Existe una alta carga de enfermedad musculoesquelética entre los profesionales de enfermería de la institución en estudio.

Descriptores: Grupo de Enfermería; Enfermedades Musculoesqueléticas; Años de Vida Ajustados por Discapacidad

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INTRODUCTION

Nursing work is known to be physically and emotionally exhausting, being associated with biological, chemical, physical, mechanical, physiological and psychological risks, which increase the chances of illness of professionals, as well as a decrease in their working capacity⁽¹⁾.

Among the main diseases that motivate workers to leave the nursing team described in the literature are those caused by Musculoskeletal Disorders (MSD), followed by mental disorders and psychological disorders. Such problems can lead to temporary or permanent absence from work activities, which can lead to total incapacity for work⁽²⁾.

Among the MSDs, the group of work-related musculoskeletal diseases (WMSDs) stands out as an important public health problem, representing the largest proportion of all occupational diseases recorded in many countries, negatively impacting the employability and quality of life of the worker, in addition to being responsible for high absenteeism and work disability⁽³⁾.

Although MSDs are common in the population, when they occur in workers, they generate absenteeism and presenteeism, respectively defined as the employee's absence from work while they are expected to be present, and when the employee attends work, however his productivity is lower than expected due to physical or psychological problems related to the disease⁽⁴⁾.

In the scenario of this study, there are increasing rates of absenteeism and presenteeism among nursing workers, among whom the number of professionals is already deficient, making it a challenge for managers to provide quantitative and qualitative human resources for the safe care of patients⁽⁵⁾.

Specifically on oncology nursing, research shows the work overload to which these professionals are exposed. Studies in palliative care, intensive care and bone marrow transplantation units have shown an association between reduced functional capacity of patients and increased nursing workload, demonstrating the

complexity and specificity of the care demanded by cancer patients⁽⁶⁻⁹⁾.

Among the scientific production related to the management of nursing human resources, we can see the evolution of research and the expansion of its scope beyond the estimate of personnel calculation, incorporating aspects such as the impact on health costs, care results, degree of dependence of patients, workload of the nursing team, factors that interfere with the productivity of professionals related to working conditions and workers' health, among others⁽¹⁰⁾.

In this sense, the aim of the study is to estimate the burden of musculoskeletal diseases that caused nursing professionals to leave a reference institution in oncology through the Disability-Adjusted Life-Years (DALY) indicator, as this reflects the impact of fatal and non-fatal outcomes throughout life, with a holistic approach when analyzing the burden of disease, in addition to being the health indicator recommended by the World Health Organization (WHO) for the Global Burden of Disease (GBD) study⁽¹¹⁾.

Among the metrics used to compose the DALY are the following indicators: Years of Life Lost due to Premature Death (YLLs) and Years Lost due to Disability (YLD). DALY, therefore, is a composite indicator that integrates premature death and damage caused by disease, sequelae or disabilities, considering different levels of severity of one or several diseases⁽¹¹⁾.

As DALY is an indicator applicable to the regional reality, it is understood that it can be used to analyze the loss of health of nursing professionals in a hospital institution, in order to analyze the magnitude of the burden of diseases that most affects this community, as well as to understand the causes, identify priorities, plan interventions, monitor trends and analyze the costs related to disability and premature death of professionals by age group and life expectancy.

This parameter can also be used as an outcome measure in economic evaluation studies, more precisely on the cost-effectiveness of health systems.

The value then obtained should guide decisions to incorporate technologies into health systems, based on the concept of opportunity cost, that is, seeking to maximize the social benefits obtained with limited health production resources⁽¹²⁾.

Thus, the following research question emerges: **What are the DALY attributable to musculoskeletal disorders that caused absence from work in nursing professionals from a reference cancer institution?**

Therefore, the objectives of the study are:

- Estimate disability-adjusted life years (DALY) caused by musculoskeletal disorders among nursing professionals in the hospital units of an oncological institution;
- Relate the identified DALY to the Global Burden of Disease Study (GBD 2019);
- Analyze the DALY by hospital unit of the oncological institution studied.

METHOD

Epidemiological study of the ecological type, based on secondary retroactive data from an institution of care, teaching and research in oncology of the federal public network, covering five hospital units with a care and quantitative profile of human resources differentiated from each other, as follows:

- Unit 1 – It has 188 beds, including 14 ICU beds; it offers care in the following specialties: abdominal pelvic, urological, pediatric oncology, head and neck, thoracic surgery, plastic surgery, neurosurgery, hematology, clinical oncology and dermatology;
- Unit 2- It has 83 beds, including 6 ICU beds; it offers care in the specialties of oncological gynecology and bone or connective tissue cancer;
- Unit 3 – It has 52 beds and treats exclusively breast cancer patients;
- Unit 4 – It has 56 beds; it exclusively serves patients referred to palliative care;
- Unit 5 - It has 12 beds for hospitalized patients to perform bone marrow transplants.

The sample consisted of all 177 nursing professionals who had, in 2021, been away from work for at least 1 day, because of one of the diagnoses related to musculoskeletal and connective tissue diseases - Chapter XIII in the International Disease Code, tenth revision (ICD-10) –, from a contingent of 1,079 nurses belonging to the permanent staff of the institution.

Nursing professionals temporarily hired by the Ministry of Health were excluded from the study, due to the relationship with the institution being short for the evaluation.

Data on leave from work were extracted from the SIASS System (Integrated Server Health Care Subsystem) through the SIAPE-Net portal, Health module, made available by the Occupational Health Division (DISAT/INCA), and were downloaded to an Excel spreadsheet with the following variables: Diagnosis; ICD-10; professional category; hospital unit; gender; age; days of leave per month, from January to December 2021.

In order to estimate the Disability Adjusted Life Years (DALY), the following formula was considered:

- $DALY = YLD + YLL$
- $YLL = \text{Number of deaths} \times \text{Life expectancy at age at death}$
- $YLD = \text{Number of cases} \times \text{Duration time until remission or death} \times \text{Weight of Disability}$

For the calculation of the DALY, the YLL indicator was considered zero in the study, because, for the GBD 2019, only rheumatoid arthritis and the group of “other DME” were considered as a cause of death, while all other diagnoses were considered non-fatal and considered the YLL zero⁽¹³⁾. In addition, there was no record of death related to musculoskeletal diseases in the period, as reported by the institution’s Occupational Health Division. Therefore, DALY estimates resulted from the calculated YLD estimates.

For the calculation of YLD, information on sick leave caused by DME was used. Three factors were multiplied: cases of the disease \times mean duration of the disease in years \times weight of disability. As there were 28 diagnoses, the number

of cases was first verified and the YLD of each diagnosis was calculated in order to respect the differences in disability weights and convalescence time of each disease. Then, they were grouped into 4 ICD-10 subgroups: arthropathies, back diseases, soft tissue disorders and osteopathy.

The factor for calculating the YLD “average duration of illness in years” was obtained by averaging the number of days of absence due to illness for each diagnosis and transformed into values in years by dividing the average by 365 days.

Disability weights were taken from the 2017 GBD study. However, due to the lack of correlation between the health states described

in the GBD and the diagnoses of the International Code of Diseases (ICD-10), it was necessary to perform an association between the diagnoses of musculoskeletal diseases (Group M in the ICD-10) found in the study with the disability weights of the GBD according to the description of health state that most closely resembled the clinical conditions of each disease found in the cohort (Table 1). Disability weights, which vary on a scale from 0 (perfect health) to 1 (equivalent to death), according to the severity of the disease⁽¹¹⁾, ranged in the study from 0.053 to 0.581, according to the association with the description of each diagnosis.

Table 1 – Association between the diagnoses of group M of the ICD-10 found in the research and the weight of disability of each health status of the GBD 2017 by similarity with its description.

Health Condition	Description of health status	Disability Weights	Diagnostic codes ICD 10
Severe hand and foot osteoarthritis	There is a severe pain in the leg, which makes the person limp and causes a lot of difficulty in walking, standing, getting up, bending down, carrying heavy things and sleeping.	0.165 (0.112-0.232)	M214, M722, M77
Severe hip osteoarthritis	There is a severe pain in the leg, which makes the person limp and causes a lot of difficulty in walking, standing, getting up, bending down, carrying heavy things and sleeping.	0.165 (0.112-0.232)	M15, M17, M199, M23, M25
Other severe arthritis	There is a severe pain in the leg, which makes the person limp and causes a lot of difficulty in walking, standing, getting up, bending down, carrying heavy things and sleeping.	0.165 (0.112-0.232)	M87, M843
Other musculoskeletal disorders severity level 3	There is moderate pain and stiffness in arms and hands, which causes difficulty getting up, carrying and holding things, and trouble sleeping because of the pain.	0.117 (0.08-0.163)	M654, M75
Other Musculoskeletal Disorders Severity Level 4	There is a severe pain in the leg, which makes the person limp and causes a lot of difficulty in walking, standing, getting up, bending down, carrying heavy things and sleeping.	0.165 (0.112-0.232)	M62, M65, M70
Other musculoskeletal disorders severity level 5	There is pain and deformity in most joints, causing difficulty moving, getting up and down, and using hands to lift and carry things. The person often experiences fatigue.	0.317 (0.216-0.44)	M797
Other musculoskeletal disorders severity level 6	There is intense and constant pain and deformity in most joints, causing difficulty moving, getting up and down, eating, dressing, carrying and using hands. The person often experiences sadness, anxiety, and extreme fatigue.	0.581 (0.403-0.739)	M45
Mild neck pain	There is neck pain and difficulty turning the head and lifting things.	0.053 (0.034-0.078)	M436
Severe neck pain	There is severe neck pain and difficulty turning the head and lifting things. The person experiences head pain and arm pain, he sleeps poorly, and feels tired and worried.	0.229 (0.153-0.317)	M508, M51, M542
Very severe neck pain	There is constant pain in the neck and arms, and difficulty turning the head, keeping the arms up, and lifting things. The person sleeps poorly, feels tired and worried.	0.304 (0.202-0.415)	M501, M541

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Health Condition	Description of health status	Disability Weights	Diagnostic codes ICD 10
Severe low back pain without leg pain	The person has severe back pain, which causes difficulty getting dressed, sitting, standing, walking, and lifting things. The person sleeps poorly and feels worried.	0.272 (0.182-0.373)	M54, M545
Severe low back pain with leg pain	The person has severe back and leg pain, which causes difficulty dressing, sitting, standing, walking, and lifting things. The person sleeps poorly and feels worried.	0.325 (0.219-0.446)	M511, M544
Moderate rheumatoid arthritis	The person has pain and deformity in most joints, causing difficulty moving, lifting and lowering, and using hands to stand up and carry things. The person often experiences fatigue.	0.317 (0.216-0.44)	M05

Source: elaborated by the author.

For comparison with other studies, in which there are different population sizes, including the last GBD report of 2019, the absolute value was adjusted for rates per 100,000 inhabitants, which were obtained considering the absolute number of DALY found, divided by the number of professionals affected by the disease, and multiplied by 100,000. The same adjustment was made by professional category, age group and sex. Thus, it was also possible to standardize the discussion between the variation of DALY between care units, which present differences between care capacity, profile of patients served and quantity of nursing professionals.

As this is an epidemiological study carried out in a federal institution of care, teaching and research, based on data available in an information system, which involves human beings directly or indirectly, this research was submitted to the ethical appreciation of the Federal University of the State of Rio de Janeiro (UNIRIO) and the National Cancer Institute (INCA), under CAAE 50348221.0.3001.5274, and approved through opinion number 5,113,433.

The Informed Consent Form was released, with a view to collecting and analyzing data at the aggregate level, with no exposure of individual information.

In the description of the study, the checklist proposed by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) was used.

RESULTS

In 2021, in the studied oncological institution, out of a population of 1,079 nursing

professionals, there was a total of 177 work absences due to musculoskeletal causes, most of whom were nursing technicians, with 120 absences (68%), followed by nurses with 57 absences (32%). Of the total, 154 (87%) were female and 23 (17%) were male. There was an age variation between 30 and 72 years, predominantly in the 40-49 age group.

Sick leave totaled 6,272 days away from work, corresponding to 1,551 days (25%) of nurses and 4,718 (75%) days of nursing technicians. Twenty eight (28) medical diagnoses related to the musculoskeletal system were identified, which were divided into 4 subgroups, according to the International Code of Diseases (ICD-10). Of these, the Back diseases group accounted for 44% of leave, followed by the Soft Tissue Disorders subgroup, with 29%.

According to Table 2, the total disability burden due to musculoskeletal disorders in 2021 was 3.78 DALY/year for all nursing professionals, 1.15 DALY for nurses and 2.63 DALY for nursing technicians. The ICD subgroup that most impacted the DALY of nursing professionals in 2021 was Back diseases, responsible for 1.97 DALY (52% of the total), of which cervical and lumbar pain were the main factors for the high burden of the disease. The disease that presented the greatest weight of incapacitation was ankylosing spondylitis, which, even though it affected only 1 nurse, due to the prolonged time of involvement, provided an increase in DALY in this professional category.

Table 2- Distribution of YLD by diagnoses of the musculoskeletal system and by professional nursing category. Rio de Janeiro, 2021.

Subgrupo XIII of ICD 10		Weight of disease	NURSE + TECHNICIANS			NURSES			TECHNICIANS		
			Cases (N)	Time (years)	YLD	Cases (N)	Time (years)	YLD	Cases (N)	Time (year)	YLD
Arthropathies											
M05	Seropositive rheumatoid arthritis	0.317	4	0.16	0.21	1	0.13	0.04	3	0.18	0.17
M15	Polyarthrosis	0.165	1	0.30	0.05	0	0.00	0.00	1	0.30	0.05
M17	Gonarthrosis [knee arthrosis]	0.165	14	0.14	0.31	1	0.03	0.00	13	0.14	0.31
M199	Unspecified arthrosis	0.165	1	0.01	0.00	1	0.01	0.00	0	0.00	0.00
M214	Flatfoot [Flatfoot] (Acquired)	0.165	2	0.01	0.00	1	0.00	0.00	1	0.01	0.00
M23	Internal disorders of the knees	0.165	6	0.07	0.07	3	0.02	0.01	3	0.12	0.06
M25	Other unclassified joint disorders	0.165	17	0.03	0.09	6	0.06	0.06	11	0.02	0.03
Subtotal					0.74				0.12		
Back diseases											
M436	Stiff neck	0.053	1	0.00	0.00	0	0.00	0.00	1	0.00	0.00
M45	Ankylosing spondylitis	0.581	1	0.49	0.29	1	0.49	0.29	0	0.00	0.00
M501	Cervical disc disorder with radiculopathy	0.304	12	0.16	0.59	4	0.18	0.21	8	0.16	0.38
M508	Other cervical disc disorders	0.229	1	0.08	0.02	0	0.00	0.00	1	0.08	0.02
M51	Other intervertebral disc disorders	0.229	1	0.32	0.07	0	0.00	0.00	1	0.32	0.07
M511	Lumbar disc disorders with radiculopathy	0.325	4	0.18	0.24	2	0.14	0.09	2	0.22	0.15
M541	Radiculopathy	0.304	1	0.01	0.00	0	0.00	0.00	1	0.01	0.00
M542	Neck pain	0.229	20	0.04	0.17	7	0.02	0.04	13	0.04	0.13
M54	Back pain	0.272	9	0.04	0.09	2	0.06	0.03	7	0.03	0.06
M544	Lumbago with sciatica	0.325	14	0.07	0.32	6	0.07	0.15	8	0.07	0.17
M545	Low back pain	0.272	13	0.05	0.18	3	0.01	0.01	10	0.06	0.17
Subtotal					1.97				0.82		
Soft tissue disorders											
M62	Other muscle disorders	0.165	15	0.10	0.24	6	0.09	0.09	9	0.11	0.16
M65	Synovitis and tenosynovitis	0.165	11	0.04	0.08	6	0.03	0.03	5	0.06	0.05
M654	Radial styloid tenosynovitis [of Quervain]	0.117	2	0.43	0.10	0	0.00	0.00	2	0.43	0.10
M70	Use-related disorders	0.165	2	0.18	0.06	0	0.00	0.00	2	0.18	0.06
M75	Shoulder injuries	0.117	12	0.19	0.27	3	0.10	0.03	9	0.22	0.23
M77	Other enthesopathies	0.165	5	0.11	0.09	0	0.00	0.00	5	0.11	0.09
M72	Fibroblastic disorders	0.165	2	0.02	0.01	1	0.02	0.00	1	0.00	0.00
M797	Fibromyalgia	0.317	2	0.21	0.14	0	0.00	0.00	2	0.21	0.14
Subtotal					0.98				0.15		

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Subgrupo XIII of ICD 10	Weight of disease	NURSE + TECHNICIANS			NURSES			TECHNICIANS			
		Cases (N)	Time (years)	YLD	Cases (N)	Time (years)	YLD	Cases (N)	Time (year)	YLD	
Osteopathy and chondropathy											
M87	Osteonecrosis	0.165	3	0.13	0.06	3	0.13	0.06	0	0.00	0.00
M843	Fatigue fracture ("stress") not classified	0.165	1	0.16	0.03	0	0.00	0.00	1	0.16	0.03
Subtotal			177		0.09	57		0.06	120		0.03
Total					3.78			1.15			2.62

Source: Made by the author

The distribution of DALY by professional category, sex and age group can be analyzed in Table 3. It is observed that the greatest burden of the disease is among female nursing technicians, aged between 50 and 59 years, whose DALY in

2021 was 0.98. Among male nursing professionals, the DALY were not expressive when compared to females, but the age group from 50 to 59 years was also the most prominent, with a loss of 0.16 DALY in 2021.

Table 3 – Distribution of the age-adjusted DALY rate of nursing professionals to 100 thousand/inhabitant. Rio de Janeiro, 2021.

Age group	Female		Male		Mean
	Nurse DALY	Technician DALY	Nurse DALY	Technician DALY	
30 to 39	0.63	0.31	0.01	0.05	0.25
40-49	0.22	0.67	0.03	0.11	0.26
50-59	0.23	0.98	0.00	0.16	0.34
> 60	0.01	0.40	0.02	0.00	0.11
Mean	0.27	0.6	0.02	0.08	

Source: Made by the author

For comparison with the GBD study, in which the rates are presented adjusted for 100,000 inhabitants, the same metric was used in order to obtain parameters in relation to the world and national population.

Thus, there were rates of 2,136 DALY/100,000 for technicians and nurses, divided between 2,024 DALY/100,000 for nurses and 2,186 DALY/100,000 for nursing technicians, considering all sexes and all ages, in 2021.

With the adjustment for DALY/100,000 rates by professional category, sex and age group, technicians remained with a higher

musculoskeletal disease burden than nurses, regardless of age, except in the age group of 30 to 39 years, in which there was a higher rate among nurses, justified by the prolonged sick leave of a nurse for ankylosing spondylitis, as previously described. Regarding gender, when compared, after standardization, male technicians have higher rates of DALY/100 thousand than females aged between 30 and 49 years. Among nurses, it was only in the age group above 60 years that men obtained the highest standardized rate. The distribution of DALY/100 thousand rates is presented in Table 4.

Table 4 – Distribution of the age-adjusted DALY rate of nursing professionals adjusted to 100 thousand/inhabitant. Rio de Janeiro, 2021.

Age group	Female sex		Male sex	
	DALY Nurse /100 thousand	DALY Technician/100thousand	Nurse DALY/100 thousand	DALY Technician/100thousand
30 to 39	4500	1550	1000	2500
40-49	1100	1769	600	2750
50-59	1643	3161	0	1778
> 60	500	3000	1000	0

Source: Made by the author

The DALY were heterogeneous among the five care units, with a certain proportionality between the value obtained and the amount of human resources of each hospital. Unit 1, which has the highest installed capacity, complexity of service, and incorporates most of the human resources, presented the highest amount of DALY (2.36 DALY, 62% of the total), while Unit 5, smaller in terms of capacity and HR, presented the lowest loss in DALY in the period. Unit 4 escapes this standard, which, despite being the fourth unit in terms of the amount of human resources, presented 0.75 DALY, higher than the sum of Units 2, 3 and 5, which presents a loss of 0.68 DALY.

When adjusting the rates to 100 thousand inhabitants, which makes the data better comparable between the units and with other scenarios, the high rates among nurses in Unit 1 (2,827/100 thousand) and nursing technicians in Unit 4 (4,655/100 thousand) stand out.

The prevalence rate of MSD in the 12-month period among all nursing professionals at the institution was 16%, being higher in nursing technicians (17%) than in nurses (15%). Among the care units, the prevalence of nursing technicians was higher in Units 1 and 3, where the rates were 19%, and in nurses, the highest rates were found in Units 1 and 4, with a prevalence of 18%, as shown in Table 5.

Table 5 – Sample distribution by hospital unit, prevalence, DALY AND DALY rate per 100 thousand per professional category and care unit. Rio de Janeiro, 2021.

Professionals/Unit	N	Prevalence (%)	DALY	DALY/100mil	
U1	Nurses	33	18	0.93	2827
	Technicians	68	19	1.43	2103
	Total	101	19	2.36	2336
U2	Nurses	7	11	0.03	381
	Technicians	21	15	0.28	1327
	Total	28	14	0.31	1107
U3	Nurses	6	12	0.04	627
	Technicians	17	19	0.31	1837
	Total	23	16	0.35	1522
U4	Nurses	8	18	0.14	1704
	Technicians	13	14	0.61	4655
	Total	21	16	0.75	3531

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Professionals/Unit		N	Prevalence (%)	DALY	DALY/100mil
U5	Nurses	4	11	0.02	499
	Technicians	0	0	0	0
	Total	4	7	0.02	499
Total	Nurses	57	15	1.15	2017
	Technicians	120	17	2.62	2183
	Total	177	16	3.78	2136

Source: Made by the author

DISCUSSION

The results of the study show that the oncological institution lost, in 2021, 3.78 DALY/year among nursing professionals due to musculoskeletal causes, an indicator that corresponds to the adjusted rate of 2136 DALY/100,000 inhabitants. The value obtained is in the mean of the Brazilian population in general, when compared to that found by the GBD for 2019 in Brazil, which caused 2218 DALY (1606-2916) per 100,000 for all musculoskeletal disorders, in both sexes and at all ages. This result, however, may indicate that there is a much higher burden of musculoskeletal disease among oncology nursing professionals than in the general population, since for this sample only data from these professionals' medical leave were considered, while in GBD, because it is a system that operates on "Big Data", data from outpatient consultations and institutional research were also accounted for, that is, a profile of individuals that, if absorbed in this study, would probably increase the estimated DALY⁽¹¹⁾.

The female sex was the one that lost the most DALY, and this result is not surprising, since nursing is a predominantly female profession, and the sample was composed of 87% of women. Females also had the highest standardized rates among nurses in all age groups and nursing technicians over 50 years. The 2019 GBD study showed a higher burden of musculoskeletal disease in females, both in the global ranking and in Brazil. While in the country men aged 15 to 49 and 50 to 69 years have approximate rates of 1796/100 thousand and 3770/100

thousand, respectively, the rates of women in the same age group rise to 2327/100 thousand and 4801/100 thousand, demonstrating a difference of almost 30% between the DALY of men and women in the general Brazilian population for these causes⁽¹³⁾.

Risk factors are added to a portion of women when the workload does not end at the end of the shift, as there is still care for the home and family. Studies show that women have a higher occurrence of MSD, due to numerous causes, in which biological, biomechanical, behavioral, sociocultural and labor factors combine to determine it⁽³⁾. In addition, women will still be more exposed after menopause, in which there is a greater risk of musculoskeletal disorders due to hormonal changes, which increase the incidence of osteoporosis, arthritis, overweight, postural instability and falls⁽¹⁴⁾.

Although the female workforce is the most exposed to MSD, in the study scenario and outside of it, the high rate of DALY/100 thousand among male technicians aged 30 to 49 years stood out in the results, compared to female nursing technicians at this same age, a fact that demonstrates that, despite being in a smaller amount in the institution, male technicians are also getting sick from musculoskeletal causes in a greater proportion than expected in a productive age group. Therefore, the organizational and social variables involved must be considered for a more in-depth analysis of this event, in order to better adapt the working conditions also for this worker profile.

According to the professional category, the technicians corresponded to the majority

of the nursing professionals in the sample, and the burden of musculoskeletal disease among them was higher than among nurses, both in absolute values and in rates adjusted to 100,000, for all ages, except in the age group of 30 to 39 years. The greatest burden of disease on the category of nursing technicians is probably due to the fact that these professionals perform more activities with ergonomic risk in their daily work, such as holding weight, orthostatic position for long periods, raising their arms above shoulder level, squatting position, repetitive movements with hands and wrists, among others⁽¹⁵⁾.

Among the diagnoses that impacted DALY in the research in 2021, those related to back disease stand out, including low back and cervical pain. Only for diagnoses related to cervical pain did the institution's nursing team lose 0.85 DALY (2500 DALY/100 thousand). In the GBD study, cervical pain, in 2019, in Brazil, for all ages and sexes, obtained a rate of 250 DALY/100 thousand, doubling in the population over 50 years of age to 589/100 thousand. The rate of cervical pain found for nursing was even higher than the highest rates in countries that stand out in this regard, such as the United States of America (1704/100 thousand), Iran (1970/100 thousand) and the Philippines (2003/100 thousand). As it is a complex, prevalent, multifactorial disorder associated with reduced quality of life, depression and reduced work capacity, the high burden of disease for neck pain among the nursing professionals of the institution studied deserves attention and planning by the managers of the institution. Studies estimate that 12% of women and 9% of men have chronic neck pain, and that the older people, manual workers, tense individuals or those who perform activities adopting postural vices are more likely to develop it⁽¹⁶⁾.

Likewise, low back pain is among the disorders with a high burden of disease, and deserves to be highlighted. It was responsible for the loss of 0.83 DALY of nursing in 2021, presenting a rate of 2075/100 thousand, which is higher than the 2019 GBD rate for Brazil, in all ages and both

sexes, which was estimated at 943 DALY/100 thousand, and still above the estimated mean for adults over 50 years of age, both sexes, which was stipulated at 1583/100 thousand⁽¹³⁾.

It is worth noting that, among the 28 ICDs identified, 15 are on the List of Work-Related Diseases (LWRD), published in Ordinance number 2,309/2020 by the Ministry of Health, that is, they can be provoked or exacerbated by exposure to risk factors in the work environment, and totaled 2.62 DALY, which is equivalent to 69% of the total DALY lost⁽¹⁷⁾. In the case of nursing work in the institution, there is an important overload due to the care of cancer patients, who require, in addition to physical effort, an emotional burden in living with this type of chronic disease. In addition to this factor, there is the issue of sizing deficient personnel in the federal public service, which, without a public tender for years, presents the loss of intellectual capital due to pensions and dismissals, counts on the seniority of the workforce, and also supported, in 2021, the increase in medical and administrative leave due to the Covid-19 pandemic⁽¹⁸⁾.

The prevalence of MSD (musculoskeletal disorders) in the 12-month period was 16% among nursing professionals in the study scenario, a rate much lower than that found in the literature, in which studies indicate prevalence of these causes in nursing professionals, between 25% and 98%⁽¹⁹⁾. This difference is justified by the data collection method, because, while the study in question considered sick leave, other studies considered symptoms in professionals during their work, that is, milder cases that did not lead to work disability. Therefore, it should be considered that there are many professionals in the studied institution who were not included in the research because they had a milder condition of the disease, who may suffer from musculoskeletal pain during their lives, and especially during the execution of the work, which can have repercussions not only on the quality of life of the workers, but on the safety of the patients they care for.

As it is a reference institution in teaching, research and cancer care, the profile of each of the 5 hospital units differs from each other in order to meet specific demands of care in cancer treatment, with differences between management, specialties, installed capacity and human resources. When analyzing the distribution of DALY by care unit, it is clear that there was certain proportionality between the number of nursing staff and DALY when Unit 1, which has a higher number of nursing professionals, had a greater loss of years lived due to disability, among them during the period. However, it is noteworthy that, even after adjusting for rate per 100,000, making the result comparable between units, nurses in Unit 1 still presented DALY above the mean of all others (2,827 DALY/100,000).

Regarding nursing technicians, Unit 4 obtained the standardized rate of 4,655 DALY/100,000, more than double the rates found in other care units, demonstrating that its technicians were the ones who presented the greatest health loss related to MSD. This unit differs from the others in that it exclusively serves patients in palliative care, which may justify the result, due to this specific public demanding great physical and psychological effort from nursing due to the high dependence to meet the needs of care and comfort.

Although the goal of treating patients in palliative care is no longer curative, there is a need for comprehensive care of the nursing team through a set of interventions mainly aimed at monitoring and control, medication, hygiene procedures, mobility and positioning and support to family members, which demands a high load of physical and emotional work of the nursing team that works with this specialty⁽⁶⁾.

Factors that enhance occupational risks for nurses and technicians in these two units should be analyzed in order to verify the causes of the high burden of disease due to MSD in these services and to plan actions to improve working conditions, which may be related to several factors, such as the degree of dependence

on hospitalized patients, staff sizing, aging of human resources, work processes, ergonomic factors of the work environment, among others.

FINAL CONSIDERATIONS

The study of DALY by MSD among oncology nursing professionals demonstrated the magnitude of the health loss of these professionals of productive age, mostly women and nursing technicians, due to diseases that may bring prolonged and permanent disability, with urgent measures to maintain productive and healthy human capital for oncology care.

Thus, it points to the need to implement actions for prevention, treatment and rehabilitation of musculoskeletal disorders, aimed at the nursing professionals of the institution in their workplaces.

The research did not intend to exhaust the theme, but to foster discussion within the scope of occupational health and health management, presenting the use of a health indicator option to the managers, researchers and professionals involved, offering subsidies for future studies, with a view to contributing to improving the quality of health of oncology nursing professionals, so that the growing demand for assistance in cancer treatment is met.

Study limitations

There is a limitation in the generalization of the results because they are information obtained from a specific population, with its own characteristics, which may not present the same risk factors for musculoskeletal disorders in other institutional scenarios.

The unit of analysis consisted of DALY due to musculoskeletal diseases that generated medical care and leave from work, and there may be an underestimation of DALY, due to the lack of milder cases of the disease.

In 2021, the world population experienced the Covid-19 pandemic, which can be understood as an atypical year for collective health, which in some way may have had an impact on the working conditions and health status of the studied population.

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