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RESEARCH ARTICLE (ORIGINAL)

Predictors of nursing workload in the diabetes surveillance consultation: Exploratory study

Preditores da carga de trabalho de enfermagem na consulta à pessoa com diabetes mellitus: Estudo exploratório

Predictores de la carga de trabajo de enfermería en la consulta a personas con diabetes mellitus: Estudio exploratorio

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Abstract
Background: The study of nursing workload is of interest because inadequate workload impacts the quality of care, patient satisfaction, professional health, and organizational outcomes.
Objective: To identify predictors of nursing workload in the diabetes surveillance consultation.
Methodology: A descriptive cross-sectional study was conducted using a quantitative approach. A sample of 242 people diagnosed with diabetes mellitus and 44 nurses was used. Data were collected through self-completion by the nurses who participated in the study.
Results: The predictors of workload are distributed between care and non-care interventions. In the care domain, the assessing, monitoring, and educating interventions have the highest predictive value. The non-care interventions are care documentation and continuity of care procedures. The workload is reflected in the time spent carrying out the interventions, with a mean consultation time of 44.4 minutes.
Conclusion: Care interventions have the highest predictive value for nursing workload, but the non-care domain should be considered.

Keywords: family nurse practitioners; nursing care; workload; diabetes *mellitus*; primary health care

Resumo
Enquadramento: O estudo da carga de trabalho de enfermagem reveste-se de interesse, isto porque, a carga desajustada impacta a qualidade dos cuidados, satisfação do cliente, saúde dos profissionais e resultados organizacionais.
Objetivo: Identificar preditores da carga de trabalho enfermagem na consulta à pessoa com diabetes *mellitus*.
Metodologia: Estudo transversal descritivo de abordagem quantitativa. Recorreu-se a uma amostra de 242 pessoas com diagnóstico de diabetes *mellitus* e 44 enfermeiros. Os dados foram recolhidos por autopreenchimento pelos enfermeiros que participaram no estudo.
Resultados: Os preditores da carga de trabalho distribuem-se pelas intervenções do domínio assistencial e não assistencial. De domínio assistencial são as intervenções avaliar, monitorizar e ensinar com maior valor preditivo. De domínio não assistencial são as intervenções documentação de cuidados, procedimentos de continuidade de cuidados. A carga de trabalho é traduzida pelo tempo despendido na realização das intervenções, com tempo médio de consulta de 44,4 min.
Conclusão: O cuidado assistencial apresenta maior valor preditivo da carga de trabalho de enfermagem, todavia o domínio do cuidado não assistencial deve ser considerado.

Palavras-chave: enfermeiras de saúde da família; cuidados de enfermagem; carga de trabalho; diabetes *mellitus*; cuidados de saúde primários

Resumen
Marco contextual: El estudio de la carga de trabajo de enfermería es interesante porque una carga de trabajo desequilibrada repercute en la calidad de los cuidados, la satisfacción de los pacientes, la salud de los profesionales y los resultados de la organización.
Objetivo: Identificar predictores de la carga de trabajo de enfermería en las consultas con personas con diabetes *mellitus*.
Metodología: Estudio descriptivo transversal con un enfoque cuantitativo. Se utilizó una muestra de 242 personas diagnosticadas de diabetes *mellitus* y 44 enfermeros. Los datos se recogieron mediante autocumplimentación por parte de los enfermeros que participaron en el estudio.
Resultados: Los predictores de la carga de trabajo se distribuyen entre intervenciones asistenciales y no asistenciales. Las intervenciones en el ámbito asistencial son la evaluación, la supervisión y la enseñanza, con el valor predictivo más alto. Las intervenciones no asistenciales son la documentación de los cuidados y los procedimientos de continuidad de los cuidados. La carga de trabajo se refleja en el tiempo dedicado a la realización de las intervenciones, con un tiempo medio de consulta de 44,4 min.
Conclusión: Los cuidados de enfermería tienen el mayor valor predictivo de la carga de trabajo de enfermería, pero debe tenerse en cuenta el ámbito de los cuidados no asistenciales.

Palabras clave: enfermeros de salud familiar; cuidados de enfermería; carga de trabajo; diabetes *mellitus*; cuidados sanitarios primarios

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Introduction

The family health nurse (FHN) "is the professional who, as part of the multiprofessional health care team, takes responsibility for providing comprehensive nursing care to families at all stages of life and in all community contexts" (Decreto-Lei n. º 118/2014 do Ministério da Saúde, p. 4070). The nursing consultation is an activity through which the nurse provides comprehensive primary health care (PHC) to individuals and families. The purpose of the surveillance consultation for people with chronic diseases, particularly those with diabetes mellitus (DM), is to empower and maximize their potential to become proactive in the treatment and maintenance of their state of health. In this consultation, the FHN carries out interventions aimed, among other things, at empowering the person to self-manage the disease (Dantas et al., 2022). The care provided by FHNs is expected to be safe and of high quality. However, the factors that mediate the relationship between workload and quality of care are still little studied, especially in PHC. Maghsoud et al. (2022) demonstrated that workload affects the quality of nursing care, job satisfaction, and professional emotional exhaustion. The demand for PHC has increased due to an aging population and an increase in chronic illnesses. Consequently, FHNs are also confronted with an increased demand for care. The objective is to identify the interventions that predict the workload of FHNs, expressed as consultation time, because studies have demonstrated a positive correlation between the hours of care provided and certain quality indicators (Maghsoud et al., 2022). The objective of this study is to identify which nursing interventions conducted during diabetes surveillance consultations predict the workload of FHNs.

Background

Nursing workload (NWL) is defined by Alghamdi (2016) as the amount of nursing time spent performing all the work related to patient care (directly and indirectly), the workplace, and professional development. Griffiths et al. (2020) have identified several instruments that make it possible to assess NWL, but most of these instruments are aimed at hospital care settings. This context influences that studies measuring NWL are predominantly conducted in hospital care settings (Aiken et al., 2014; Ivziku et al., 2022; Qureshi et al., 2020). When there is an imbalance between NWL and human nursing resources, there is a greater likelihood of error, increased mortality, and reduced quality of life for the professional (Aiken et al., 2014; Ivziku et al., 2022; Qureshi et al., 2020). In their study, Ivziku et al. (2022) identified the complexity of patient care, the teams' human resources, and some aspects of workflow as predictors of workload in the HC context. With regard to PHC, there are few studies, and the instruments used are designed for specific research purposes (Bonfim et al., 2016; Grafen & Mackenzie, 2015). Nevertheless, these studies allow identifying care needs, mapping nursing interventions, measuring the time required to perform them, and predicting resources required to meet patients' needs.

Research question

Which nursing interventions conducted in the diabetes surveillance consultation predict FHNs' workload?

Methodology

A descriptive cross-sectional study was conducted using a quantitative approach. The study was carried out in a Health Center Cluster (ACeS), made up of 12 Health Care Centers (HCC) with 34 functional FHC units and Personalized Health Care Units (UCSP). The sample consisted of FHNs who agreed to participate in the study from a population of 167 FHNs. The sample consisted of 44 FHNs working in the FHC and UCSP units. The inclusion criteria for the FHNs were: having a list of assigned patients, carrying out diabetes surveillance consultations, and having worked at the FHC/UCSP units for more than 3 months. The inclusion criteria for patients were: having a medical diagnosis of DM, regardless of the date of diagnosis; having a surveillance appointment with the FHN, and the appointment being scheduled. The sample consisted of 242 patients. Written or verbal information was provided to the FHNs on how to include the patients in the study. A grid was used - Family Health Nurse Workload Assessment Instrument - Nursing Consultation - Diabetes - IACTENFF_CE_DIA. The IACTENFF_CE_DIA grid contains 69 items that identify interventions that can be carried out by the FHN in the diabetes surveillance consultation. The grid contains the following items: 29 assessing interventions, 8 monitoring interventions, 19 educating interventions, two preparing interventions, one planning intervention, one training intervention, one promoting intervention, one administering intervention, one referring intervention, one assisting intervention, and one encouraging intervention. These items allow assessing care interventions. The non-care interventions include the following activities: welcoming, infection control procedures, continuity of care procedures, and care documentation. The grid also allows adding interventions that the FHN carries out and which are not included. FHNs are expected to record the interventions they have carried out and the time taken to carry them out (in minutes/seconds). All the items on the grid are mandatory, even if the option is not to record them. The mandatory nature of the recording process makes it possible to identify that the intervention was not carried out intentionally. The IACTENFF_CE_DIA grid is hosted on an online platform with the domain https://actenff.pt. In order to gain access to the data collection platform, the FHN was required to first register with exclusive user credentials. The data collection period spanned from October 2019 to December 2020. The data collected by the FHNs was automatically saved and associated with the user ID and stored in a web database,

which was then exported to an Excel file. Subsequently, the data was transferred to the IMB SPSS Statistics software, version 26.0, where statistical analysis was conducted. Given the nature of the variables under study, absolute (n) and percentage (%) frequencies were determined, as were measures of central tendency, such as means, and measures of variability and dispersion, such as standard deviation, range, and coefficient of variation. The following assumptions were made in order to determine the FHN interventions that predict NWL in diabetes surveillance consultations: Correlations were established between the variables and the following categories: strong correlations ($0.70 \leq r \leq 0.89$), moderate correlations ($0.40 \leq r \leq 0.69$), and weak correlations ($0.20 \leq r \leq 0.39$).

The study was approved by the Board of Directors and the Clinical and Health Council of the ACeS. The study was approved by the Health Ethics Committee with opinion number 34/2019-CES of the institution where it was conducted. All participants (nurses and patients) were required to provide informed consent.

Results

To determine the predictors of FHNs' workload, the interventions included in the IACTENFF_CE_DIA grid were taken into account. The care interventions and the non-care interventions were considered. The care domain interventions include assessing, monitoring, educating, and training, among others. The non-care domain interventions include the subdomains of welcoming, infection control procedures, continuity of care procedures, and care documentation.

Table 1

Distribution of the absolute and relative frequency of the assessing and monitoring interventions

Subdomain	Execution	
	n	%
+Assessing health/disease transitions		
assessing personal history of disease	47	19.4
assessing the risk of diabetic ulcers	122	**50.4**
assessing acceptance of health status	50	20.7
assessing self-administration of medication (e.g. insulin)	23	9.5
assessing self-care	*8*	*3.3*
assessing grieving	2	0.8
+ Assessing knowledge		
and potential to improve knowledge about DM	130	**53.7**
and potential to reduce alcohol consumption	40	16.6
and potential to reduce tobacco consumption	8	3.3
potential and ability to manage medication regime	131	**54.1**
potential and ability to manage therapeutic regime	109	45.0
potential and ability to manage physical exercise regime	131	**54.1**
potential and ability to carry out self-surveillance/self-monitoring	34	14.0
on foot self-surveillance/self-monitoring	129	**53.3**
on self-surveillance/self-monitoring of capillary blood glucose	57	23.6
self-monitoring/self-monitoring of blood pressure	39	16.1
potential and ability to self-administer medication	29	12.0
potential to improve knowledge of immunization regime	33	13.6
and potential to increase knowledge of diabetic ulcer prevention	91	37.6
potential and ability to manage dietary regime	155	**64.0**
+ Assessing behaviors		
alcohol consumption	79	32.6
tobacco consumption	56	23.1
use of other substances	2	0.8
adherence to medication	186	**76.9**
adherence to physical exercise regime	151	**62.4**
adherence to dietary regime	180	**74.4**
adherence to therapeutic regime	139	**57.4**
adherence to self-monitoring/self-monitoring of feet	115	47.5
adherence to self-surveillance/self-monitoring of capillary blood glucose	63	26.0
adherence to self-monitoring/self-monitoring of blood pressure	38	15.7
assessing adherence to the immunization regime	112	46.3
+ Monitoring		
height	130	**53.7**
weight	236	**97.5**
body mass index (BMI)	226	**93.4**
abdominal circumference (AC)	203	**83.9**
blood pressure (BP)	239	**98.8**
heart rate (HR)	224	**92.6**
urine parameters	6	2.5
glycated hemoglobin A1c (HAb1C)	75	31.0
capillary blood glucose	40	16.5
international normalized ratio (INR)	4	1.7
pain	16	6.6

Note. n = Sample; % = Percentage.

Table 1 shows the diagnostic interventions carried out by the FHNs. In assessing the health/disease transition, the most common intervention was assessing the risk of diabetic ulcers, with 50.4%. Acceptance of health status and personal history of disease were assessed in 20.7% and 19.6% of all consultations, respectively. Assessment of knowledge, potential to improve knowledge and ability to manage the dietary regime was carried out in 64% of consultations. The assessment of knowledge, potential and ability to manage the medication regime and the physical exercise regime were both carried out in 54.1% of consultations. The assessment of knowledge about DM and the potential to improve it was carried out in 53.7% of consultations. The assessment of knowledge and potential to improve foot self-monitoring was carried out in 53.3% of consultations. With regard to behavioral assessment, the intervention of assessing adherence to medication and dietary regimes stood out, with 76.9% and 74.4% respectively. The assessment of adherence to the physical exercise regime was carried out in 62.4% of consultations. The assessment of adherence to the therapeutic regime (assessment of dietary regime, medication regime, and physical exercise regime) was carried out in 57.4% of consultations. All the other interventions were carried out, with a frequency below 50%. There were 11 monitoring interventions, which involved assessing the anthropometric and physiological parameters of the people being consulted, namely monitoring weight, height, BMI, BP, HR, urine parameters, and HbA1C. The intervention to monitor BP and weight was carried out most frequently, achieving rates of 98.8% and 97.5% respectively. BMI was monitored by 93.4%, heart rate by 92.6%, AC by 83.9%, and height by 53.7%. On the other hand, HbA1C was monitored by 31%, capillary blood glucose by 16.5%, pain by 6.6%, urine parameters by 2.5%, and INR by 1.7%.

Table 2

Distribution of the absolute and relative frequency of the educating, preparing, training, promoting, administering, referring, assisting, encouraging, and executing interventions

Subdomain	Execution	
	n	%
+Educating about		
the importance of adherence to the medication regime	132	**54.5**
the importance of self-monitoring/self-monitoring of blood pressure	39	16.1
the importance of foot self-supervision/self-monitoring	118	48.8
the importance of adhering to a physical exercise regime	137	**56.6**
the importance of adhering to a dietary regime	171	**70.7**
the importance of adherence to the therapeutic regime	124	**51.2**
the importance of adherence to self-surveillance/self-monitoring of capillary blood glucose	47	19.4
prevention of diabetic ulcers	115	47.5
diet	170	**70.2**
self-administration of medication	24	9.9
diabetes mellitus	147	**60.7**
adaptive strategies	37	15.3
physical exercise	134	**55.4**
harms of consuming addictive substances	5	2.1
harms of smoking	8	3.3
signs of hypo- and hyperglycemia	89	36.8
grieving process	2	0.8
+Preparing		
Exercise plan	36	14.9
Diet plan	58	24.0
+Training		
Self-surveillance/self-monitoring (capillary blood glucose; blood pressure)	11	4.5
+Promoting		
Adherence to immunization regime	73	30.2
+Administering		
vaccines	42	17.4
injections	1	0.4
+Referring		
to other professionals	2	0.8
+Assisting		
the person to accept their health status	38	15.7
+Encouraging		
Emotional communication	70	28.9
+Executing		
Wound treatment	3	1.2

Note. *n* = Sample; % = Percentage.

Table 2 illustrates the interventions carried out by the FHNs in relation to the diagnoses. Educational interventions were carried out more frequently. Educating about the importance of adhering to the dietary regime was carried out in 70.7% of consultations, followed by educating about food with 70.2%. Educating about DM accounted for 60.7% of the interventions carried out. Educating about the importance of adhering to a physical exercise regime and educating about the importance of adhering to a medication regime were carried out in 56.6% and 54.5% of consultations, in that order. The interventions of educating about physical exercise and educating about the importance of adherence to the therapeutic regime were carried out in 55.4% and 51.2% respectively.

Table 2 also shows the set of interventions that give rise to the subdomains prepare, plan, promote, administer,

refer, assist, encourage, and execute. Of these interventions, the one carried out most frequently was promoting adherence to the immunization regime, with 30.2%, and encouraging emotional communication was carried out in 28.9% of consultations.

Table 3

Distribution of the absolute and relative frequency of interventions of welcoming, infection control procedures, continuity of care procedures, and care documentation

Subdomain	Execution	
	n	%
+Welcoming		
Welcoming the person (call and greeting)	218	**90.1**
+Infection control procedures		
Hygiene care/hand washing, disinfection of spaces and equipment	141	**58.3**
+Continuity of care procedures		
Referral (RNCCI, UCC, etc.)	211	**87.2**
+Care documentation		
+Care documentation (record keeping, internal referrals, etc.)	224	**92.6**

Note. *n* = Sample; % = Percentage.

The non-care domain consists of four subdomains: welcoming, infection control procedures, continuity of care procedures, and care documentation. The care documentation subdomain was the most frequently performed, accounting for 92.6% of consultations. This subdomain can be characterized by the record keeping necessary for continuity of care and internal referrals, among others. Regarding the welcoming subdomain, the preparation prior to the consultation and the calling and greeting of the person to the office/consultation were carried out in 90.1% of the consultations carried out by the family nurses. Continuity of care procedures, which for the purposes of this study were considered external referrals (National Integrated Continuing Care Network, among others), were performed in 87.2% of consultations. The subdomain of infection control procedures, which included hand washing and disinfection of physical spaces and equipment, was performed in 58.3% of consultations.

Predictors of FHNs' workload in the diabetes surveillance consultation

To determine the predictors of NWL in diabetes surveillance consultations, all the care and non-care interventions were considered, with the interventions grouped into subdomains (e.g. assessing). Interventions with a percentage (%) of implementation greater than 50% in the subdomains were considered most predictive of NWL. Thus, in the subdomain 'assessing health/disease transitions', the intervention 'assessing the risk of diabetic ulcers' was the most predictive of NWL; with regard to 'assessing knowledge', the interventions 'assessing knowledge and potential to improve knowledge about DM', 'assessing potential and ability to manage physical exercise regime', 'assessing knowledge on foot self-surveillance/self-monitoring', 'assessing potential and ability to manage diet', and 'assessing potential and ability to manage medication regime' were the most predictive; with regard to 'assessing behaviors', the most predictive interventions were 'assessing adherence to medication', 'assessing adherence to dietary regime', and 'assessing adherence to therapeutic regime'. The most predictive interventions in the monitoring subdomain were: height; weight; BMI; BP; AC; HR. In the educating subdomain, the interventions that were most predictive were: educating about the importance of adherence to the medication regime; educating about foot self-surveillance/self-monitoring; educating about physical exercise, dietary and therapeutic regime; educating about prevention of diabetic ulcers and DM. Regarding the non-care domain, all dimensions were predictive of NWL.

Table 4

Distribution of mean, standard deviation, coefficient of variation, minimum and maximum values by subdomain related to workload predictors

Workload predictors	*n*	M	SD	CV	Min	Max
+ Care interventions						
Assessing	240	973	902.0	92.7	10	4995
Educating	236	751	551.3	73.4	50	3000
Preparing	68	255	209.5	82.2	60	1200
Training	11	64	41.2	64.4	20	180
Promoting	72	67	47.2	70.4	1	240
Administering	43	104	108.5	104.3	3	600
Referring	1	120	---	---	120	120
Assisting	37	73	80.1	109.7	20	300
Encouraging	66	148	135.7	91.9	10	600
Executing	3	250	262.1	104.8	30	540
+Non-care interventions						
Welcoming	217	75	169.0	225.3	3	2400
Infection control procedures	140	113	164.2	145.3	2	1800
Continuity of care procedures	210	103	205.9	199.9	1	2400
Care documentation	221	208	205.9	99.0	10	1800
Total workload (sec)	**242**	**2665**	**1785.9**	**67.0**	**750**	**9420**

Note. M = Mean; *SD* = Standard deviation; CV = Coefficient of variation; Min = Minimum; Max = Maximum.

Table 4 shows the mean, standard deviation, coefficient of variation, minimum and maximum values of the interventions carried out by FHNs per subdomain and the number of interventions carried out in each subdomain. Workload in the assessing subdomain is translated into the number of times an assessing intervention was carried out in the consultation. The same principle is applied to all subdomains. The minimum execution time for all interventions in the assessing subdomain was 10 seconds and the maximum time was 4995 seconds (83.25 minutes). The lowest mean time for all interventions performed was in the assisting subdomain and was 73 seconds (1.2 minutes). The continuity of care subdomain was the most common non-care intervention performed, with a mean time of 208 seconds (3.5 min) and a maximum time of 1800 seconds (30 min). The total NWL varied between a minimum of 750 seconds (12.5 min) and a maximum of 8,160 seconds (136 min), with a mean of 2,247 seconds (37.45 min). The non-care workload varied from 12 to 5040 seconds (84 minutes), with a mean of 435 seconds (7.25 minutes). The workload time was calculated based on all 242 consultations (100%), but the total non-care time was calculated from the contribution of 94.6% (229) of the consultations. The total time for a diabetes surveillance consultation varied between a minimum of 750 seconds, a mean of 2665 seconds, and a maximum of 9420 seconds. The mean consultation time was 44.4 minutes.

Discussion

PHC has been identified as the privileged setting for the prevention and treatment of chronic diseases. PHC professionals have played a leading role in the diagnosis and control of these chronic diseases, as the PHC is the link to the national health system. The study found that in the diabetes surveillance consultation, FHNs provide care (care domain) and non-care (non-care domain) interventions. Care interventions were carried out in the following subdomains: assessing, monitoring, educating, preparing, training, promoting, administering, referring, assisting, encouraging, and executing. These results are corroborated by the studies by Bonfim et al. (2016) and Michel et al. (2021), in that they also identified interventions such as educating, monitoring anthropometric parameters, administering medication, among others, as interventions associated with care. Regarding the non-care domain, the FHNs' interventions were in the following subdomains: welcoming, infection control procedures, continuity of care procedures, and care documentation. These results are in line with international studies that group the care provided by nurses into four categories: direct care (patient care), indirect care (non-care), service-related aspects, and personal aspects (Alasalvar & Yilmaz; 2023; Bonfim et al., 2016; Michel et al., 2021). Care planning, medication preparation, infection control, documentation, and referral interventions were identified

as non-care interventions. Care documentation in PHC is, among other things, evidence of effective communication between nurses and the other professionals on the team. Nursing documentation in Portugal is mainly done using the Sclinico-CSP information system. In this study, care documentation was found to be a predictor of NWL, similar to the studies conducted by Shihundla et al. (2016) and Alasalvar and Yilmaz (2023), which showed a relationship between care documentation and an increase in nurses' workload, regardless of the information system used. The workload assessment study (Michel et al., 2021) shows that nurses spend a lot of time performing activities that are predominantly non-care interventions. However, the results of this study are contradictory, as the time spent by nurses is mostly devoted to care interventions. The study's results can be understood in light of the type of care provided in the FHC/UCSP context. The results of the study show that the mean consultation time was 44.4 minutes, of which 37.4 minutes were spent on direct care and 7 minutes on indirect care, thus deviating from the results of Alasalvar and Yilmaz (2023), who found that nurses spent 68.02 minutes on direct patient care and 61.02 minutes on indirect care. The study results also indicate a significant deviation (14.4 minutes) from the 30-minute consultation time established in Regulation 473/2019, proposed by the Portuguese Nursing Regulator. The study has some limitations that should be mentioned. The number of consultations carried out is lower than initially estimated, due to the early end of data collection caused by the pandemic period experienced during the implementation phase of the study, so the sample size can be considered a limitation for the interpretation of the results. There may have been a bias in data collection, in identifying the interventions carried out, and in recording the time taken to complete them, as the collection method was self-completion.

A suggestion for further research would be to use the IACTENFF-CE-DIA instrument in different contexts of clinical practice in diabetes surveillance, with more significant samples to allow a psychometric evaluation of the instrument.

Conclusion

To effectively manage NWL, it is essential to identify and quantify the predictors of workload. The study enabled the identification and quantification of nursing interventions conducted during diabetes surveillance consultations that predict workload. Among the predictors identified, those with the greatest impact on NWL relate to the direct provision of care, namely interventions such as assessment, monitoring, and education. Furthermore, non-care was identified as a predictor of FHNs' workload, although with a lower weighting. The results obtained can assist in comprehending the PHC workload in functional FHC and UCSP units. These results can be of significant value in determining an optimal nurse/person/family ratio, tailored to the specific needs of surveillance and monitoring. Furthermore, these findings can assist in the determination of the optimal number of nurses required to ensure the delivery of safe and high-quality nursing care.

Author contributions

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