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Task redistribution from general practitioners to nurses in acute infection care: A prospective cohort study

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Abstract

Aim: To examine the impact of implementing nurse-led consultations compared to physician-led consultations on the frequency of follow-up contacts within 14 days following an acute infectious consultation.

Design: Monocentric, prospective cohort study.

Methods: The study was conducted in a multidisciplinary, capitation-based general practice in Belgium. Through analysis of patient files, the number of follow-up contacts within 14 days after an infection consultation was investigated to determine any difference between physician-led or nurse-led consultations. Secondary outcomes included pharmacological interventions and the prescribing behaviour of medical leave certificates.

Results: A total of 352 consultations were analysed, of which 174 conducted by physicians and 178 by nurses. No significant difference was found in the number of follow-up contacts. However, the probability of a pharmacological intervention by a physician was revealed to be significantly higher. The presence or absence of such pharmacological intervention did not significantly influence the number of follow-up contacts.

Conclusion: This study demonstrates that nurses can be safely and efficiently utilized in acute infection care within a general practice setting. Although these results are promising, more extensive research is needed which incorporates the experiences of patients and healthcare providers. Furthermore, it is advisable to consider the experience and education of the nurses and incorporate them into the analyses.

Impact: This study addressed the high workload on general practitioners by researching a task shift in the acute infectious, primary health care. The results demonstrate the feasibility of this task shift, which may have an impact on primary health care professionals (whose workload may be reorganized), as well as on patients for whom primary care may become more accessible.

Patient or Public Contribution: This study includes direct patient data from people who presented themselves with acute infectious complaints in a primary healthcare practice.

KEYWORDS
acute care, infectious diseases, nurse role, primary care, task redistribution

1 | INTRODUCTION

A combination of demographic, political and societal changes has led to an increasing gap between the demand for healthcare services and the available supply. This has consequences for both patients, who find it increasingly difficult to secure appointments with general practitioners (GPs), and for GPs themselves, who are faced with tremendous workloads and must often choose between healthcare quality, efficiency and maintaining a healthy work–life balance.

A report by the Belgian Healthcare Knowledge Center (KCE) in 2019, on the performance of the Belgian healthcare system revealed that in 2016, there were 3.07 practising physicians per 1000 inhabitants, which was 13.2% less than the European average of 3.54 per 1000 inhabitants. When examining the number of GPs, the report indicated 0.79 full-time practising GPs per 1000 inhabitants in Belgium. While this figure could not be directly compared to other European countries, the report clearly highlighted a shortage of GPs. Additionally, the report noted that the absolute number of physicians remained stable between 2000 and 2016, but there was an increasing trend of ageing within the physician workforce (Devos et al., 2019).

In addition to the shortage of GPs, political decisions have led to a shift from inpatient to outpatient care. The 2017 policy vision of the Minister of Health in Flanders emphasized integrated care in primary care, facilitated by technological advancements (home monitoring, eHealth, etc.) and a new model of hospital financing. In this model, hospitals are incentivized financially to reduce the number of inpatient days (Agentschap zorg en gezondheid, 2017). This resulted in more patients requiring (complex) medical care in their home environment, necessitating increased follow-up by GPs (de Bleser et al., 2017; Leefmilieu, 2019).

Furthermore, the growing and ageing population not only leads to an increase in healthcare demand but also to an escalation in healthcare complexity in primary care. The rising healthcare demand is not solely due to population growth but is also a result of increased population density, globalization and climate change, which, in turn, increase the risk of infectious diseases and local epidemics, as well as the potential for pandemics (STATBEL, n.d.; Thomas, 2020). In general practice, this translates into an increase in patients seeking consultations for acute infectious complaints. The COVID-19 pandemic has demonstrated that the quality of care for patients with chronic conditions is compromised due to this increased demand (van Giessen et al., 2020).

2 | BACKGROUND

Despite the aforementioned reasons for increased workload in primary healthcare, a shift is occurring that has the potential to alleviate the pressure on GP's. Innovative projects related to the role of nurses have shown that their competencies can be utilized more extensively within general practices. Initially, nurses were deployed to perform technical nursing procedures such as blood sampling, wound care, cryotherapy, etc. Over time, there have been pilots with further shifting responsibilities, allowing nurses to also manage patients with chronic conditions. Literature has demonstrated that a collaborative model between GPs and nurses redistributes the workload and leads to an increase in healthcare quality (Fabrellas et al., 2011; Latour et al., 2007; Norful et al., 2018; World Health Organization, 2020).

A preliminary systematic literature review confirms that nurses are not only capable of managing patients with chronic conditions but can also play a role in acute primary care. The included studies analysed the difference in the number of patient re-visits for the initial complaint between GP-led and nurse-led consultations. None of these studies reported a significant difference between GP-led and nurse-led consultations (Drennan et al., 2015; Iglesias et al., 2013; Myers et al., 1997; Pritchard & Kendrick, 2001; Shum et al., 2000). However, the available literature typically looks at the entire spectrum of acute complaints, encompassing both infectious and non-infectious issues (e.g. wounds, low back pain, etc.).

2.1 | The study

The primary objective of this research is to evaluate whether there is an impact on the outcome of the consultation (within 14 days) of a patient with an acute infectious complaint in a nurse-led consultation compared to a GP-led consultation. A consultation was successful when no follow-up contact was registered. Secondarily, we investigate the effect of this shift in responsibilities on the prescribing of medical leave certificates and the number of pharmacological interventions, and whether this has an impact on the number of re-visits within 14 days. By addressing these research questions, this study aims to assess the feasibility of nurse-led acute infectious consultations within a general practice.

3 | METHOD

The study is designed as a monocentric prospective cohort study conducted in a multidisciplinary, capitation-based primary care practice. The practice has 3000+ registered patients and is situated in the metropolitan, multicultural environment of Antwerp. The organization is characterized by a broad deployment of primary care nurses who not only perform technical nursing procedures but also oversee chronic care, engage in project work and provide acute infection care. For acute infection care, the practice has developed nursing guidelines based on the standards of the Dutch College of General Practitioners, and an internal training programme was implemented regarding physical examination and clinical diagnostic reasoning. At the start of data collection, the nursing acute infection care had already been integrated for 8 months.

The study population includes patients who presented themselves between November 1 and December 31, 2022, with one or more acute, mild infection complaints. A mild infection complaint

is defined as a somatic complaint that is self-limiting under normal circumstances and can be treated through adequate self-care (Wood, 2008). The concept of 'acute' is used in a similar fashion as in previous research for patients who desire a consultation on the same day (Fabrellas et al., 2011; Iglesias et al., 2013; Kinnersley et al., 2000; Myers et al., 1997; Pritchard & Kendrick, 2001). The exclusion criteria applied are pregnancy, chest pain, shortness of breath, coughing up blood, blood in excretions, immunocompromised patients, or patients younger than two or older than 80 years. In a preliminary literature review, two Spanish studies were identified where the outcome of a consultation was evaluated after 7 days (Fabrellas et al., 2011; Iglesias et al., 2013). All other similar studies found employed a 14-day period (Drennan et al., 2015; Iglesias et al., 2013; Myers et al., 1997; Pritchard & Kendrick, 2001; Shum et al., 2000). To address the primary research question, it was decided to analyse the patient records at a minimum of 14 days after the consultation.

Based on existing literature, a conceptual model, as shown in Figure 1, concerning the factors influencing the outcome of an infection consultation was developed in collaboration with the second author and a GP in training. Based on this model, a measurement instrument was developed. Its content was further validated using a content validity index. This index was completed by three nurses, five GP's, seven GP's in training and four assistant specialists working in healthcare organizations across Flanders. Items with a score <0.78 were excluded. The item-score is calculated by dividing the number of respondents who agree that the variable is relevant to the research question by the total number of respondents.

The measurement instrument was translated into a Qualtrics questionnaire to analyse the patient records efficiently and systematically in relation to the research questions. Variables were measured concerning demographic data, the healthcare provider's level of education, medical history, clinical examination, diagnosis, intervention(s), and any follow-up contacts. Nominal variables were presented in the Qualtrics questionnaire as multiple-choice questions, with an option for free-text input provided for each question. The possible answer options were initially determined by the first author and the last author. Subsequently, the measurement instrument was tested in the practice for 1 month to further refine it. To ensure that the necessary data were recorded in the patient records, an information session was organized for the participating healthcare providers and receptionists. During this session, the research protocol was discussed, and the importance of accurate record-keeping was emphasized. In the consulting rooms where infection consultations were conducted, the data required for data analysis were schematically presented on a flyer. Additionally, an optional template could be copied into the electronic record to systematically document the consultation.

To avoid bias related to the difficulty level of a consultation, patients in the group of GPs were only included when there were no nurse-led infection consultations. In situations where both a GP and a nurse were conducting infection consultations, a receptionist (supported by a flowchart) decided which provider the patient would be assigned to, based on availability in the *schedule* and the inclusion and exclusion criteria. The flowchart was implemented into the daily operation of the receptionists in August

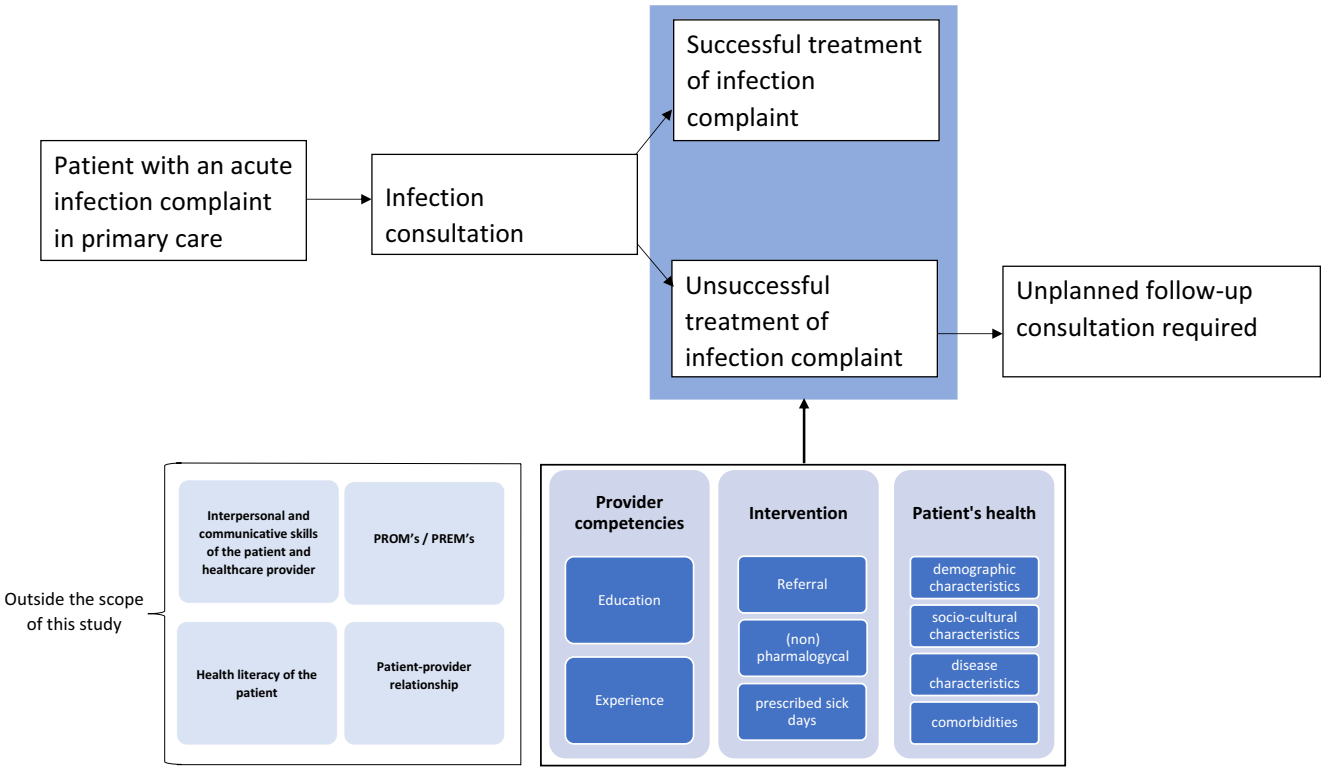

FIGURE 1 Conceptual model regarding an acute infection consultation in the general practitioner's office.

2022, 3 months before the start of data collection. During these 3 months, the triage flowchart was updated twice based on feedback received.

The sample size was determined using an a priori Chi-squared power analysis with an alpha of 0.05, power of 0.80, and an effect size of 0.15. This analysis resulted in a required sample size of 349 patients. The infection consultations were conducted by six GP's, three GP's in training, and three registered nurses. The nurses had 2, 15 and 30 years of nursing experience. Regarding acute infection care, one nurse had 1 month of experience, and two nurses had 8 months of experience. The data were pseudonymized during collection and analysed using the SPSS program (Statistical Package for the Social Sciences, IBM SPSS Statistics®).

4 | RESULTS

4.1 | Population description

A total of 352 acute infection consultations were analysed, with 178 conducted by nurses (intervention group) and 174 by GP's (control group). The distribution of demographic variables is presented in Table 1, where no significant differences were found between the control and intervention groups. As illustrated in Table 2, 90.6% of patients presented with respiratory complaints, 36.6% with gastrointestinal complaints, and 83.2% with general complaints such as fever or muscle pain. In nurse-led consultations, 'sore throat' ($p < .001$) and 'decreased appetite' ($p = .037$) were recorded more frequently. No other significant differences were found.

In the results concerning the clinical examination shown in Table 3, it was observed that nurses more frequently documented abnormal throat examinations ($p < .001$) and/or lymph node examinations ($p = .029$). Among GP's, it was more frequently reported that patients had a body temperature ≥ 37.5°C ($p = .03$), an abnormal lung examination ($p = .038$), and/or a red eardrum ($p = .031$). GP's also conducted ear examinations more frequently ($p = .008$). There were no significant differences in all other examinations and observations.

4.2 | Follow-up contacts within 14 days

In 14.5% of the total study population, there was either a physical or telephone follow-up contact with the practice within 14 days, related to the original presenting complaint. There was no significant difference between the control and intervention groups ($p = .547$) according to the data presented in Table 4. Additionally, multivariable regression analysis shown in Table 5, demonstrates that the healthcare provider's role does not influence this outcome (OR 0.86, 95% CI 0.464–1.582), adjusted for age and general complaints.

4.3 | Pharmacological interventions

In 56.3% of consultations conducted by GP's, a pharmacological intervention was performed compared to 35.4% by nurses ($p < .001$). This includes both prescription medications and over-the-counter medication. Performing a pharmacological intervention does not have a significant effect on the presence or absence of follow-up within 14 days. The p-values are, respectively, .82 for GP's and .67 for nurses (using a 2-sided Fisher's exact test). Multivariable regression analysis shows a 3.8 times higher likelihood of a pharmacological intervention being performed in a consultation led by a GP compared to one led by a nurse, adjusted for age and body temperature. This model is adjusted for age and body temperature.

4.4 | Medical leave certificate

The average duration of a prescribed medical leave certificate was 2.9 days, with a standard deviation of 1.5 and a maximum of 9 days. No significant difference was found between GP's and nurses in either the number of days prescribed ($p = .319$) or the decision to prescribe a medical leave certificate ($p = .085$). Additionally, multivariable regression analysis for this outcome variable also indicates that the healthcare provider's role has no predictive value (OR 0.78, 95% CI 0.441–1.395). Finally, the results indicate that whether or not a medical leave certificate is prescribed has no effect on the number of follow-up contacts within 14 days. The p-value for GP's is .357, and for nurses, it is 1.000, calculated using a 2-sided Fisher's Exact Test.

Figure 2 illustrates the differences between physician-led and nurse-led consultations, as determined by the aforementioned outcome variables.

5 | DISCUSSION

Due to the high demand for primary care services, there is an ongoing search for new collaboration models and opportunities for healthcare substitution. The objective is to enhance organizational efficiency while maintaining or improving the quality of care. There is already substantial evidence of the value that nurses can bring to a general practice, primarily focusing on technical nursing procedures and chronic care management. This study demonstrates that nurses can also play a role in the acute infection care in a general practice.

The results of this study suggest that there is no difference in the number of follow-up contacts (within 14 days) between GP's and nurses. Based on these results, it can be assumed that the health outcomes are similar between nurses and GP's. Moreover, nurses performed fewer pharmacological interventions without impacting the number of follow-up contacts. Literature indicates that medication is often prescribed for infection complaints, while guidelines often

TABLE 1 Demographic variables of patients.

Total group: *n* 352		Control group: *n* 174		Intervention group: *n* 178		
Variables	**Total group: *n* (missings)**	**Measures of central tendency and dispersion**	**Total group**	**Control group**	**Intervention group**	***p*-value**
Age in years	352 (0)	Mean (*SD*)	24.2 (18.6)	24.2 (19.7)	24.2 (17.5)	.560[b]
		Minimum–Maximum (range)	2–80 (78)	2–80 (78)	2–78 (76)	
Duration of symptoms	341 (11)	Mean (*SD*)	4.2 (2.6)	4.2 (2.2)	4.3 (3.0)	.919[b]
		Minimum–Maximum (range)	1–28 (27)	1–14 (13)	1–28 (27)	
Variables	**Total group: *n* (missings)**	**Answer options**	**Total group: % (*n*)**	**Control group: %[a] (*n*)**	**Intervention group: %[a] (*n*)**	***p*-value**
Sex	352 (0)	Male	45.7 (161)	48.9 (85)	42.7 (76)	.285[c]
		Female	54.3 (191)	51.1 (89)	57.3 (102)	
Age in years	352 (0)	2–5	12.2 (43)	14.9 (26)	9.6 (17)	.371[d]
		6–11	21.9 (77)	20.7 (36)	23.0 (41)	
		12–17	13.6 (48)	12.1 (21)	15.2 (27)	
		18–64	48.3 (170)	47.1 (82)	51.8 (88)	
		65–80	4.0 (14)	5.2 (9)	2.8 (5)	
Nationality	315 (37)	Belgium	83.5 (263)	87.3 (138)	79.6 (125)	.271[d]
		Dutch	3.2 (10)	2.5 (4)	3.8 (6)	
		Turkish	0.3 (1)	0.6 (1)	0.0 (0)	
		Moroccan	3.8 (12)	3.2 (5)	4.5 (7)	
		Other	9.2 (29)	6.3 (10)	12.1 (19)	
Country of birth	335 (17)	Belgium	68.4 (229)	72.1 (119)	64.7 (110)	.211[d]
		The Netherlands	2.7 (9)	1.2 (2)	4.1 (7)	
		Turkey	0.3 (1)	0.6 (1)	0.0 (0)	
		Morocco	8.1 (27)	8.5 (14)	7.6 (13)	
		Other	20.6 (69)	17.6 (29)	23.5 (40)	
Employment status	344 (8)	Employee	16.6 (57)	16.4 (28)	16.8 (29)	.451[d]
		Worker	15.4 (53)	14.6 (25)	16.2 (28)	
		Civil servant	0.6 (2)	0.0 (0)	1.2 (2)	
		Self-employed or in a liberal profession	0.6 (2)	1.2 (2)	0.0 (0)	
		Invalidity or long-term illness	1.7 (6)	2.3 (4)	1.2 (2)	
		Unemployed	3.8 (13)	3.5 (6)	4.0 (7)	
		Retired	3.8 (13)	5.3 (9)	2.3 (4)	
		Student	5.8 (20)	5.3 (9)	6.4 (11)	
		Pupil	50.3 (173)	50.9 (87)	49.7 (86)	
		Other	1.5 (5)	0.6 (1)	2.3 (4)	

[a]Within the group.

[b]Mann–Whitney *U* (2-tailed).

[c]Fisher's exact test (2-sided).

[d]Pearson Chi-square (two sided).

recommend non-pharmacological interventions (Fiore et al., 2017; Jaume et al., 2018). This prescribing behaviour can be influenced by patient expectations for medication or physicians assuming that patients expect medication. Since nurses in Belgium do not have prescribing authority, they provide patients with non-pharmacological interventions or advice on over-the-counter medications. No differences were found between nurses and GP's regarding the issuance of medical leave certificates or the number of sick days prescribed. This suggests that nurses make similar assessments to GP's regarding the severity of symptoms and the expected recovery time.

Although the sample size in this study is smaller than in similar literature, similar statistical results were obtained regarding the

TABLE 2 Symptoms and the presence or absence of comorbidities.

Total group: *n* 352			Control group: *n* 174	Intervention group: *n* 178		
Symptoms		Total group: *n* (missings)	Total group: % (*n*)	Control group: %[a] (*n*)	Intervention group: %[a] (*n*)	*p*-value
General symptoms	Prescence of a general complaint	352 (0)	83.2 (293)	80.5 (140)	86.0 (153)	.199[b]
	Fever		59.4 (209)	55.7 (97)	62.9 (112)	.193[b]
	Headache		41.8 (147)	37.9 (66)	45.5 (81)	.161[b]
	Fatigue		14.5 (51)	13.2 (23)	15.7 (28)	.547[b]
	Body aches/muscle pain		11.6 (41)	13.2 (23)	10.1 (18)	.408[b]
	Decreased appetite		25.3 (89)	20.1 (35)	30.3 (54)	.037*[b]
	Decreased drinking		5.1 (18)	2.9 (5)	7.3 (13)	.088[b]
	Dizziness		3.1 (11)	4.6 (8)	1.7 (3)	.136[b]
Respiratory symptoms	Prescence of a respiratory complaint		90.6 (319)	90.8 (158)	90.4 (161)	1.000[b]
	Coughing/sneezing		69.6 (245)	69.5 (121)	69.7 (124)	1.000[b]
	Stuffy nose/runny nose		31 (109)	31 (54)	30.9 (55)	1.000[b]
	Mucus		17 (60)	20.1 (35)	14.0 (25)	.156[b]
	Sore throat		46.6 (164)	37.9 (66)	55.1 (98)	.001**[b]
	Earache		17.6 (62)	16.7 (29)	18.5 (33)	.676[b]
	Respiratory issues		4.5 (16)	4.0 (7)	5.1 (9)	.799[b]
Gastrointestinal symptoms	Prescence of a gastrointestinal complaint		36.6 (129)	36.8 (64)	36.5 (65)	1.000[b]
	Vomiting		13.6 (48)	14.9 (26)	12.4 (22)	.536[b]
	Nausea		8.8 (31)	10.1 (18)	7.5 (13)	.453[b]
	Abdominal pain		16.5 (58)	14.9 (26)	18.0 (32)	.475[b]
	Diarrhoea		9.4 (33)	10.3 (18)	8.4 (15)	.586[b]
Patients with chronic illness/significant medical history		352 (0)	32.4 (114)	31.6 (55)	33.1 (59)	.820[b]

[a]Within the group.

[b]Fisher's exact test (2-sided).

*$p < .05$. **$p < .01$.

primary outcome (number of follow-up contacts within 14 days). However, there is a difference in pharmacological interventions. British studies did not find such a difference (Drennan et al., 2015; Myers et al., 1997; Pritchard & Kendrick, 2001; Shum et al., 2000), while a similar Spanish study (Iglesias et al., 2013) as our study did show a statistically significant difference. This can be explained by the fact that British nurses have prescribing authority (after additional training), while this is not the case in Spain and Belgium. Considering that many guidelines for acute infection complaints suggest that medication is usually not necessary, the inability of nurses to prescribe medication in the context of acute infection care may be more of an advantage than a disadvantage. Moreover, research has shown that patient satisfaction depends more on good information than on a prescription for medication (Welschen et al., 2004).

The descriptive analyses show that there are substantive differences between consultations conducted by GP's and those by nurses in this study. Nurses more frequently encountered throat complaints, while GP's had more patients with abnormal ear examinations. Additionally, abnormal lung auscultations and patients with a body temperature >37.5°C were more common in consultations with GP's. One possible explanation is that reception staff, responsible for scheduling of the infection consultations, already filter cases based on expected severity and complexity.

Epidemiological data indicate that the period during which data was collected (November–December) is characterized by a high number of patients with respiratory infections (Bossuyt et al., 2023; Daniels et al., 2023). This is also evident from the results of this study, with 90.6% of cases involving one or more respiratory complaints, compared to 36.6% with gastrointestinal complaints. The clinical diagnostic process for gastrointestinal complaints is characterized by a complex diagnostic landscape, which includes consideration of liver, pancreas, kidney, intestinal, genital and gynaecological conditions, in addition to infections. This makes the diagnostic process more challenging for gastrointestinal complaints compared to respiratory complaints. While the research results are promising, further research over a more extended period is required to make generalizable conclusions.

Due to limitations of the electronic patient record system, there was no access to patient record data from outside the general

TABLE 3 Findings from the clinical examination.

Total group: *n* 352		Control group: *n* 174		Intervention group: *n* 178	
Clinical examination	**Findings**	**Total group: % (*n*)**	**Control group: %[a] (*n*)**	**Intervention group: %[a] (*n*)**	***p*-value**
Lung examination	Number of examinations	74.4 (262)	74.1 (129)	74.7 (133)	.714[b]
	Normal	90.2 (238)	86.0 (111)	94.1 (127)	.038*[b]
	Wheezing/stridor	5.3 (14)	7.8 (10)	3.0 (4)	.102[b]
	Ronchi	5.3 (14)	7.8 (10)	3.0 (4)	.102[b]
	Crepitus	2.7 (7)	3.9 (5)	1.5 (2)	.273[b]
Throat examination	Number of examinations	73.9 (260)	70.1 (122)	77.5 (138)	.117[b]
	Normal	36.9 (96)	50.0 (61)	25.4 (35)	<.001***[b]
	Swelling	13.5 (35)	5.7 (7)	20.3 (28)	<.001***[b]
	Redness	59.2 (154)	45.9 (56)	71.0 (98)	<.001***[b]
	Exudate	3.8 (10)	4.1 (5)	3.6 (5)	1.000[b]
Lymph node examination	Number of examinations	26.4 (93)	23.0 (40)	29.8 (53)	.183[b]
	Normal	63.4 (59)	65.0 (26)	62.3 (33)	.831[b]
	Swelling	24.7 (23)	30.0 (12)	20.8 (11)	.339[b]
	Sensitive/painful	18.3 (17)	7.5 (3)	26.4 (14)	.029*[b]
Ear examination	Number of examinations	47.7 (168)	55.2 (96)	40.4 (72)	.008**[b]
	Normal	60.7 (102)	62.5 (60)	58.3 (42)	.634[b]
	Ear discharge	4.2 (7)	6.3 (6)	1.4 (1)	.241[b]
	Bulging eardrum	4.2 (7)	4.2 (4)	4.2 (3)	1.000[b]
	Fluid behind eardrum	11.9 (20)	11.5 (11)	12.5 (9)	1.000[b]
	Red eardrum	11.9 (20)	16.7 (16)	5.6 (4)	.031*[b]
Temperature	Number of examinations	30.7 (108)	28.7 (50)	32.6 (58)	.488[b]
	<37.5°C	74.1 (80)	64.0 (32)	82.8 (48)	.030*[b]
	37.5–40°C	25.9 (28)	36.0 (18)	17.2 (10)	.030*[b]
Abdominal examination	Number of examinations	13.9 (49)	13.2 (23)	14.6 (26)	.759[b]
	Soft abdomen	81.6 (40)	73.9 (17)	88.5 (23)	.273[b]
	Normal peristalsis	75.5 (37)	69.6 (16)	80.8 (21)	.508[b]
	Abnormal peristalsis	10.2 (5)	8.7 (2)	11.5 (3)	1.000[b]
	Tender to touch	42.9 (21)	34.8 (8)	50.0 (13)	.388[b]
	Muscle guarding	6.1 (3)	8.7 (2)	3.8 (1)	.594[b]
	Rebound tenderness	2.0 (1)	4.3 (1)	0.0 (0)	.469[b]

[a]Within the group.

[b]Fisher's exact test (2-sided).

*$p < .5$. **$p < .01$. ***$p < .001$.

practice. Therefore, it was not possible to determine whether patients presented to the primary care out-of-hours service or secondary care within 14 days after the initial presentation. Given the usually mild, self-limiting course of acute infection complaints, this is expected to have a minimal impact on the research results.

To evaluate the effect of nursing care in acute infection management, this study primarily focused on the outcome of the consultation. Patient experience, duration of symptoms, and the opinion of GP's were not investigated. Regardless that our study results demonstrate no increased health risk for patients, such task redistribution form GP's to nurses also requires the support of the medical team and the trust of patients to be successful (Kingsley & Patel, 2017; Norful et al., 2018). Furthermore, it is important to consider the experience and education of the participating nurses, as these factors can significantly influence the consultation outcomes. Due to the limited scale of this study, involving only three participating nurses, it was not feasible to incorporate this consideration into the interpretation of the results.

The practice where the research took place has a clear and supported vision about the roles of nurses in general practice. While nurse-led acute infection care is relatively new, patients were already accustomed to consulting nurses for follow-up and advice. Since the success of a consultation depends also on the patient's experience and trust in the healthcare provider (Friedel

TABLE 4 Difference between control and intervention group in 4 outcome variables.

Total group: *n* 352		Control group: *n* 174		Intervention group: *n* 178		
Variables	***n***	**Measures of central tendency and dispersion**	**Total group**	**Control group**	**Intervention group**	***p*-value**
Duration of medical leave certificate	249	Mean (*SD*)	2.9 (1.5)	3.1 (1.8)	2.7 (1.1)	.319[b]
		Minimum–Maximum (range)	1–9 (8)	1–9 (8)	1–7 (6)	

Variables	**Answers**	**Total group: *n* (missings)**	**% (*n*)**	**Control group: %[a] (*n*)**	**Intervention group: %[a] (*n*)**	***p*-value**
Pharmacological interventions	Yes	352 (0)	45.7 (162)	56.3 (98)	35.4 (63)	<.001***[c]
	No		54.3 (191)	43.7 (76)	64.6 (115)	
Sick leave certificates prescribed	Yes	352 (0)	68.8 (242)	64.4 (112)	73.0 (130)	.085[c]
	No		31.3 (110)	35.6 (62)	27 (48)	
Follow-up contacts within 14 days	Yes	352 (0)	14.5 (51)	13.2 (23)	15.7 (28)	.547[c]
	No		85.5 (301)	86.8 (151)	84.3 (150)	

[a]Within the group.
[b]Mann–Whitney *U* (2-tailed).
[c]Fisher's exact test (2-sided).
***$p < .001$.

TABLE 5 Multivariable logistic regression analyses for 3 outcome variables.

		Follow-up contact within 14 days[a] *n* 352	**Pharmacological interventions[a] *n* 108**	**Sick leave certificates[a] *n* 260**
Variable	***N***	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Function (ref. nurse)				
Nurse	178	0.86 (0.464–1.582)	3.84 (1.596–9.232)	0.78 (0.441–1.395)
Physician	174			
General symptoms (ref. no)				
No	59	6.79 (1.57–29.33)		
Yes	293			
Temperature (ref. <37.5°C)				
<37.5°C	80		4.23 (1.516–11.777)	
≥37.5°C	28			
Headache (ref. no)				
No	205			2.49 (1.396–4.438)
Yes	147			
Red throat (ref. no)				
No	106			1.97 (1.098–3.516)
Yes	154			
Nagelkerke R^2		0.093	0.241	0.178

[a]Adjusted for age.

et al., 2023; Lavallee et al., 2016), the results may differ when the study is repeated in a practice where nurse-led consultations are less common.

The legal and economic aspects are also crucial elements in the development of the nursing role. For nurses in general practice settings, it is currently not possible to bill for procedures or make diagnoses autonomously. Although creative solutions are being explored to address this issue, the legal framework often acts as a barrier to nursing autonomy. Studies like ours, however, demonstrate that it is possible, and hopefully policymakers will be encouraged to make decisions in support of nursing autonomy.

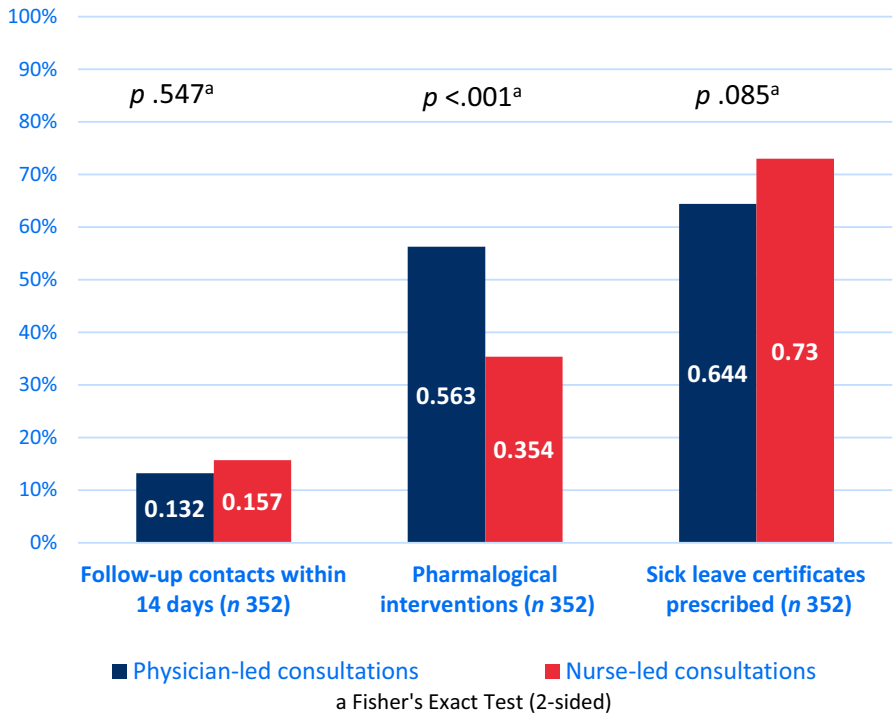

FIGURE 2 Differences between physician-led and nurse-led acute infection consultations. [a]Fisher's exact test (2-sided).

The research results of this study suggest that nurses can be efficiently, effectively and safely deployed in acute infection care. However, it cannot be denied that there is a significant shortage of nurses. Developments within the nursing profession offer opportunities to attract more people (Vandenbroucke, 2023). While the traditional role of nurses mainly involved assisting physicians, the profession is increasingly recognized as one based on scientific research and where responsibility can be taken. Although it may initially seem that the shortage of GP's is being filled by nurses (who are also in short supply), this shift in responsibilities may pique the interest of a broader audience in pursuing a nursing education.

6 | CONCLUSION

The results of this study demonstrate that a nurse has the potential to participate in the acute infection care of a general practice, and this can be done safely. There appears to be no difference between physician-led and nurse-led consultations in terms of the consultation-outcome for patients with acute infection symptoms. Furthermore, fewer unnecessary pharmacological interventions are performed without impacting the number of follow-up contacts.

However, there are other aspects that need to be explored, such as patient experience and the opinions of other healthcare providers, to enable broad implementation of this model. In future research, the data collection period needs to be conducted sufficiently to account for seasonal characteristics of acute infectious diseases in primary care.

Additionally, it is advisable to repeat this study in a multicentre design, involving a combination of capitated and fee-for-service practices, with a larger group of nurses participating to assess the impact of individual differences. Despite the limitations of this study, the results can serve as motivation and guidance for healthcare organizations to initiate similar initiatives.

AUTHOR CONTRIBUTIONS

LD, LS and PVB: development of the research question, LD and PVB: establishment of the research strategy, LD: data collection, LD and PVB: data analysis, LD, LS and PVB discussion construction and writing-review. LD and PVB are the guarantors of this research. All authors contributed to the article and approved the submitted version.

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CONFLICT OF INTEREST STATEMENT

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

PEER REVIEW

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DATA AVAILABILITY STATEMENT

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Approval was obtained from the management of the involved primary care practice as well as the Ethics Committee of the University Hospital Antwerp on 25/07/2022 with ID number 3634. Since the data were collected through file analysis, and the patient did not experience any impact from the study, informed consent was not required.

STATISTICS

The authors have checked to make sure that our submission conforms as applicable to the Journal's statistical guidelines.

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