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A survey of the current nurse practitioner and physician assistant workforce in Dutch ambulance care

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ABSTRACT

Background: Dutch ambulance service faces future challenges due to acute care development, patient changes, demographics, increased ambulance runs and regional differences. Ambulance Care Netherlands published a framework titled "Pilot physician assistant and nurse practitioner ambulance care". Within this framework, a role is proposed so that their qualifications can provide solutions to future challenges. Despite the introduction of nurse practitioners and physician assistants into Dutch ambulance care, little is known about the effects of this introduction or the tasks these professionals perform. Nevertheless, they are being called upon, even though it is not known whether their potential contribution to the desired outcome described in the framework

Objective: This study aims to provide an overview of all nurse practitioners and physician assistants working in Dutch ambulance care and the tasks they perform.

Design: We used a cross-sectional exploratory study design. The nurse practitioners and physician assistants participated in a structured telephone survey.

Setting: Emergency ambulance services in the Netherlands

Participants: A total of 56 respondents participated in a telephone survey.

Results: We found 53 nurse practitioners and 20 physician assistants working in Dutch ambulance care, 56 participated in the survey. Their performance of both direct care and indirect care tasks differed considerably. While some nurse practitioners and physician assistants were fully autonomous in-patient care, others were bound by regulations and restrictions.

Conclusions: We found large variations between respondents in direct and indirect care task, number of working hours, and the different positions within the different Emergency ambulance services in the Netherlands. As a result, the established framework cannot presently function but can provide sound guidance to different ambulance services in positioning their nurse practitioners or physician assistants.

1. Background

The Dutch Emergency Medical Services (EMS) is very well organized and tries to guarantee that in >92% of the emergency cases a Dutch ambulance is on the scene within 15 min. Ambulance crews consist of a specialized nurse and an ambulance driver. After a dedicated 18 months training program they are licensed to administer medical treatment independently at advanced life support level

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aided by a national ambulance protocol (Backus et al., 2020).

In many Western countries, hospital emergency departments are overcrowded, leading to a desire to strengthen primary care, especially after office hours (Smits et al., 2021). There has also been an increase in ambulance care contacts (Hoeymans et al., 2014). Ageing populations, changes in social support, accessibility and increasing health awareness in the community are causes of this increase (Lowthian et al., 2011, Lovink et al., 2017). Labour shortages have also occurred, partly due to the outflow of emergency workers due to retirement (Zorg komt komende jaren honderdduizend werknemers tekort 2021). The Dutch ambulance service also faces many future challenges due to acute care development, patient changes, demographics, regional differences, and patient-centredness (Ambulancezorg Nederland 2017). These challenges could lead to decreased accessibility to emergency care and repeated requests for ambulance care, including for primary care problems (Edwards et al., 2015, Søvsø et al., 2019, Jones et al., 2017, Booker et al., 2017, Christensen et al., 2020, van Vliet et al., 2020, Ebben et al., 2017). Part of the increase in volume and complexity is a growing proportion of patients who do not need transportation to a hospital after triage, diagnosis and treatment. Onsite treatment requires neither transportation to a hospital, the so-called mobile care consultation (Sangster-Gormley et al., 2013).

In October 2020, Ambulance Care Netherlands published a framework titled "Pilot physician's assistant and nurse practitioner ambulance care (Ambulancezorg Nederland 2020). With this framework developed an action plan to have nurse practitioners and physician assistants maintain clearly defined positions in ambulance care so that their qualifications could be used to the fullest. This framework focused on developing and expanding the national ambulance protocol for mobile care consultation by nurse practitioners and physician assistants. The expectation is that the contributions of nurse practitioners and physician assistants to the ambulance care system will allow for customised care, which could positively impact the changing care landscape.

Nurse practitioners and physician assistants are qualified and allowed to indicate and perform some of the so-called "reserved procedures", and combine nursing care with medical care (Vogel and MA, 2018). Following changes to Dutch healthcare legislation in 2018, they have the right to independently indicate and perform certain medical procedures, such as catheterization, cardioversion, defibrillation, endoscopy, injecting, puncturing, prescribing and simple surgical procedures. Previously, these procedures were reserved exclusively for doctors, dentists and midwives (De Bruijn-Geraets et al., 2014).

In recent years, several ambulance nurses in the Netherlands have graduated with a master's degree in advanced nursing practice or a master's degree as a physician assistant. Since the first degrees were offered in 2004, it has been expected that several qualified nurse practitioners or physician assistants will be employed in this sector. Despite introducing these professionals into Dutch ambulance care, little is known about their impact or the tasks they perform. Several studies have been conducted on the implementation of nurse practitioners and physician assistants (Lovink et al., 2017, Sangster-Gormley et al., 2013, Martin-Misener et al., 2015, Woo et al., 2017). These have indicated a higher quality of care, increased patient satisfaction and the potential for reducing physician workload and direct care costs.

This study was limited to long-term care and primary care settings. A recent systematic review showed limited available evidence on the effects of introducing nurse practitioners or physician assistants in ambulance care (van Vliet et al., 2020). Due to the lack of research and a national registration system, little is known about nurse practitioners and physician assistants working in Dutch ambulance care. For example, nothing is known about this group's size or how it is distributed across different ambulance services in the Netherlands. Except for demographic data, there has been little insight into nurse practitioners' and physician assistants' tasks. They are being called upon even though it is unknown whether it is feasible. The questions remain as to whether their daily practice relates to the sectoral framework and, ultimately, whether they can contribute to the desired development of Dutch ambulance care (Ambulancezorg Nederland 2020).

This study aims to provide an overview of the nurse practitioners and physician assistants working in Dutch ambulance care and the tasks they perform.

2. Methods

For this cross-sectional exploratory study, nurse practitioners and physician assistants were approached to participate in a structured telephone survey. The snowball method (Sadler et al., 2010) was used to create a complete survey. This study is not subject to the WMO (Medical Research Involving Human Subjects Act), All respondents were asked the same questions, were assured anonymity of their responses and gave their consent to the use of the anonymized data.

2.1. Setting

Ambulance care in the Netherlands is provided by 25 regional emergency medical services. They can be a public or private organisation or a combination of the two (Overheid.nl 2019). The number of ambulance personnel in 2020 was 6,541 (Ambulancezorg Nederland 2017). This total consists of care staff, ambulance drivers and support staff.

2.2. Respondents

The respondents were qualified nurse practitioners or physician assistants working for a Dutch emergency medical service. They were either Master of Science-trained nurse practitioners or Master of Science-trained physician assistants (Netherlands/European Qualifications Framework, Level 7). Apprentices were included in the survey, but they were not interviewed. A recruitment strategy with snowball sampling was used to identify the invisible population of nurse practitioners and physician assistants (Sadler et al., 2010). First, the researchers' network was contacted, and the respondents were asked for contact information for nurse practitioners

and physician assistants employed in ambulance care in the Netherlands. This information provided input for the total overview.

2.3. Data collection and analysis

Telephone interviews were conducted from June 2021 to October 2021. The data collected from them were analysed using IBM SPSS Statistics version 25.0

3. Results

Within the Dutch ambulance system, 73 (n=53 nurse practitioners and 20 physician assistants) participated in the study. There were also 30 ambulance nurses in training for a master's degree, 13 of whom were nurse practitioners and 17 of whom were physician assistants. Full interviews were performed in 76.7% (n=56), all of whom were graduates. Participants ranged in age from 31 to 62 (mean age= 48, SD= 6.6) and 71% were men (n=40).

The nurse practitioners and physician assistants were spread across multiple ambulance services throughout the Netherlands. Of the 25 ambulance services, 72% (n=18) employed one or more nurse practitioners or physician assistants, and only 28% (n=7) employed five or more nurse practitioners or physician assistants. 48% (n=12) of the 25 ambulance services decided to work only with nurse practitioners or physician assistants. For a complete overview, see Table 1.

The national map shows the number of nurse practitioners and physician assistants per ambulance service (see Fig. 1). In addition to the group of certified professionals at the time of the data analysis, several professionals were training to become nurse practitioners and physician assistants, totalling 30. They will complete their training in 2022 and 2023, respectively. With this contribution, distribution in the Netherlands will change rapidly, and the group will grow to a staff of 103 within a few years.

3.1. Education

The surveyed nurse practitioners and physician assistants had worked as ambulance nurses for an average of eight years before beginning their master's degrees (average 8.7 years, range 2–20 years). After two to two-and-a-half years of education, they were employed for an average of four years (average 4.8 years, range 0–15 years). Before working for emergency medical service, they were educated as registered nurses (Netherlands/European Qualifications Framework, level 4 or 5), with supplementary training as intensive care nurses (n = 35), coronary care unit nurses (n = 3), emergency nurses (n = 7) or anaesthesia nurses (n = 7). Four were registered nurses without specialist training.

Only 64.3% (n=36) of the respondents were contracted as nurse practitioners and physician assistants and had job descriptions that matched their education. 35.7% (n=20) were employed as ambulance nurses, which did not align with their education. The average working hours were 32.04 per week, with a range from 12 to 40. There were also salary differences. While 56.3% (n=46) were classified as job rating 60, meaning they were at the same salary level as ambulance nurses, 22 of them received a monthly allowance. 14.1% (n=10) were classified as one scale higher (job rating 65).

36.6% (n=28) also worked for an employer other than the ambulance services that contracted them. Of these, 53.5% (n=15) worked for general practitioners outside of working hours, 28.5% (n=8). worked for general practitioners, 14.2% (n=4) 3.5% held a military contract or contract with another employer and 7.1% (n=1) worked at a hospital. The majority, specifically 16, performed this work because of a secondment from their employer. Of these, 11 had an employment contract with another employer and one professional was self-employed. All had taken these positions to gain experience or to remain updated in medically reserved procedures

Table 1
Results of NPs and PAs in various emergency medical services in October 2021.

Emergency medical services number and name		Professional		Total (n)
		PA (n)	NP (n)	
	01 ambulance zorg Groningen	4	4	8
	04 RAV IJsselland	7	1	8
	05 Ambulance Oost	8	0	8
	07 RAV Gelderland Midden	0	2	2
	08 RAV Gelderland Zuid	2	1	3
	09 RAVU	2	4	6
	11 and 13 ambulance Amsterdam / Zaanstreek Waterland	3	1	4
	15 GGD DenHaag Witte Kruis Ambulancezorg, Ambulancezorg Zoetermeer	2	0	2
	16 RAV Hollands Midden	1	2	3
	17 Ambulancezorg Rotterdam-Rijnmond VRR/BIOS	2	1	3
	19 RAV Zeeland	2	0	2
	20 and 21 RAV Brabant Midden West Noord	12	0	12
	22 RAV Brabant Zuidoost	2	4	6
	23 Ambulancezorg Limburg Noord	2	0	2
	24 RAV Zuid Limburg	1	0	1
	25 RAV Flevoland	3	0	3
Total	53	20	73	

Abbreviations: nurse practitioner (NP), physician assistant (PA)

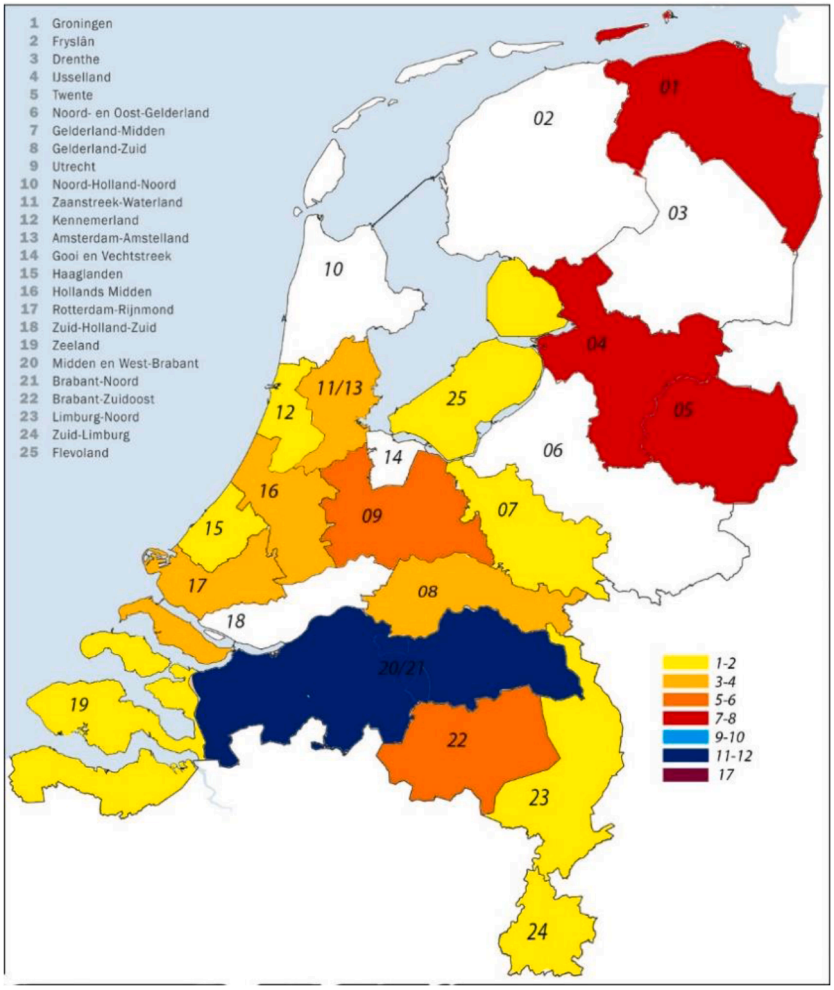

Fig. 1. Overview of the Netherlands with the number of nurse practitioners and physician assistants per emergency medical service.

because ambulance service lacked these opportunities.

3.2. Tasks

A distinction was made between direct care and indirect care tasks to describe the tasks that the nurse practitioners and physician assistants performed.

3.3. Indirect care tasks

Sixty-four percent (n=36) of participants performed indirect care tasks. Indirect care tasks included medical policy advice, evaluating individual care or task consultations with other discipline providers (n=35), developing training (n=30); conducting scientific research, conducting calamity or incident investigations (n=27). Of these 36 participants, the majority (n=24) reported indirect care tasks consuming $>$ 25% of their working time; 9 reported $<$75% working time and 3 reported 100% working time.

3.4. Direct care tasks

Three respondents indicated that they had no patient contact, two supported their medical management full time, and one worked in an ambulance dispatch centre and had occasional telephone contact with patients.

There was considerable variance in the number of working hours and how the respondents filled them; thus, there was also a difference in the total number of patient contact hours. The range of contract hours with an ambulance service ranged from 12 to 40 h a week. Within this range, the respondents indicated that they had contact with patients from 3 to 36 h per week. The direct care tasks varied significantly among emergency medical services. Two types can be distinguished: [1]working in the traditional role of an

ambulance nurse in an ambulance with a driver and [2] working independently in a rapid responder vehicle without transport capacity. The majority had a 36-h contract ($n = 32$), with a large proportion having patient contact between 20 and 36 h per week (see Table 2).[1]

A total of 17 of the 56 respondents stated that they only worked on a team with a driver of a fully equipped ambulance guided by an ambulance dispatch centre. They had no additional medical tasks and were expected to work in accordance with the national ambulance protocol. They did not perform work requiring a master's-level education. Of the 17 respondents, 12 reported making medical decisions beyond those that the national ambulance protocol stipulated, based on their independent authority. Six out of 12 made agreements with their medical managers. Six of the 17 carried extra medical supplies and performed reserved actions outside the national ambulance protocol guidelines, such as placing stitches or prescribing medication. They used an otoscope ($n = 6$), point-of-care tests with urine or blood ($n = 6$) and additional medication ($n = 6$).

A total of 19 of the 51 respondents worked alternately on a team or in a solo role. They did so in a fully equipped ambulance or a vehicle without transport capacity. An ambulance dispatch centre directed both. On average, they worked in a solo role with half of their patient contacts. During their work in the ambulance, they were expected to follow the national ambulance protocol with no additional frameworks. In their solo role, the majority made decisions outside the national ambulance protocol ($n = 15$), even though half had no mandate to do so. They said they did this based on their authority, while less than half ($n = 6$) had an agreement with their medical manager to deviate from the protocol. During solo activities, 12 of the 19 performed reserved procedures outside the national protocol, such as placing sutures ($n = 12$) or prescribing medication ($n = 9$), using an otoscope ($n = 12$), performing a point-of-care test with urine ($n = 11$) or blood ($n = 3$), giving a point-of-care ultrasound ($n = 4$) and using additional medication outside the protocol ($n = 9$). [2]

A total of 14 of the 51 respondents performed direct care tasks individually. Their vehicles were fully equipped as ambulances, had no transport capacity and were directed by the ambulance dispatch centre. Out of this group, 10 had the mandate to deviate from the national ambulance protocol. A total of 13 of the 14 made medical decisions outside the national protocol on their authority. They all performed reserved procedures outside the national protocol, including placing stitches ($n = 12$) and prescribing medication ($n = 10$). They also used an otoscope ($n = 10$), point-of-care tests with urine ($n = 12$), point-of-care ultrasound ($n = 7$) and additional medication ($n = 10$) outside the protocol. Of all the emergency medical services with nurse practitioners or physician assistants on staff ($n = 18$), two had nurse practitioners or physician assistants in a solo role, and one had a nurse practitioner available seven days a week for direct care tasks.

All nurse practitioners and physician assistants who made decisions or performed medical treatment not described in the national ambulance protocol ($n = 39$) did so based on their authority. They used guidelines from the Dutch General Practitioners Association (NHG-Richtlijnen 2021), the Dutch Association of Emergency Physicians (De Nederlandse Vereniging van Spoedeisende Hulp Artsen (NVSHA) 2021), and their insights or experiences obtained from other medical sectors (e.g., working for a general practitioner or an emergency department). Regarding the reserved procedures that nurse practitioners or physician assistants are legally allowed to perform, 60% (n=31) of the respondents performed surgical procedures. These are medical procedures in which the connection of body tissues is broken and does not immediately recover (e.g., the placement of stitches or thoracostomy). Other procedures, which include injection, cardioversion, defibrillation, endotracheal intubation, thoracosynthesis and coniotomy, were already allowed to perform in the capacity of ambulance care. A total of 50% (n=26) of respondents prescribed drugs.

At the time of writing this article, eight ambulance services partially implemented the physician assistant and nurse practitioner ambulance care framework. Again, this framework clearly outlines the roles nurse practitioners and physician assistants can play in ambulance care. Yet no emergency medical service had 24-h coverage with nurse practitioners or physician assistants, and only one ambulance service had daily coverage. The respondents indicated that this was due to various factors, the most important being the shortages of nurse practitioners and physician assistants in the organisation. Moreover, no vision or plan at an organisational or medical management level called for nurse practitioners or physician assistants to have different roles than ambulance nurses. A total of 22 respondents indicated that there were plans within their organisation to implement the sectoral framework in the short term, but they did not expect it to happen within the year.

4. Discussion

This survey found that 73 master's degree–trained professionals worked in ambulance care in the Netherlands, and 30 were still in training. Therefore, the number will potentially reach 103 people in a few years. Considering the total number of ambulance nurses in 2020 (Sangster-Gormley et al., 2013), 103 represented a small percentage of 4.8%. Nonetheless, they maintained significant positions within the various emergency medical services. A total of 39 respondents were part of medical management and influenced the

Table 2
Patient contact hours versus contract hours.

	Percentage of direct care tasks	<25% (n)	25-50% (n)	>75% (n)	100% (n)	Missing (n)	Total (n)
Contract hours	Part time <20 h/week	0	1	0	5	0	6
	Between 20 and 32 h/week	1	4	2	4	1	12
	Full time >34 h/week	7	9	14	6	1	37
	Total	8	14	16	15	2	55

organisation's medical policy. They shaped training and were involved in consultations with chain partners. It is therefore plausible that, despite their small numbers, they had a significant voice in and influence on policy. Follow-up research could investigate the impact of nurse practitioners or physician assistants on medical management.

Nurse practitioners or physician assistants can improve acute care in several ways, one of which is to participate at the interface of general practitioner care. Experience gained while working for a general practitioner can be used in an ambulance (Laurant Kalinka van de et al., 2014). We found 23 respondents working as general practitioners. Again, such experience could positively impact patient care, but this study did not investigate this. Nevertheless, we found that providing therapeutic options beyond the national protocol for ambulance care perhaps unknowingly builds bridges between in-hospital, out-of-hospital and prehospital care to improve overall care.

The group that alternated between teamwork and solo roles led to the assumption that they performed the same activities as ambulance nurses when working on a team because there were no deviating frameworks or agreements for other competencies. Yet 12 respondents indicated that they performed activities outside national protocols, and only half had clear agreements with their medical managers. They brought additional skills that they deployed based on their competence. Even though nurse practitioners and physician assistants did the same work as ambulance nurses, they remained legally responsible for their actions, even if there were no agreements with medical management.

This study provides clarity for the first time on the number and diversity of the tasks of nurse practitioners and physician assistants in the Dutch emergency medical services. Whether their introduction caused an improvement in acute care remains unclear. Laurent et al. (Laurant Kalinka van de et al., 2014) stressed the necessity for nurse practitioners and physician assistants to balance production, care coordination, quality and research and noted that these professionals are increasingly acting as role models. This survey showed a great diversity of tasks for nurse practitioners and physician assistants. All emergency medical services have given nurse practitioners and physician assistants positions within their organisations at their discretion. The emphasis was on supporting medical management and not on completing direct care tasks. A balance between these two responsibilities has not yet been achieved, and nurse practitioners cannot yet assume leadership roles.

Ambulance Care Netherlands published a framework on deployment options for nurse practitioners and physician assistants in ambulance care (Ebben et al., 2017). Despite the lack of an overview of the availability of these professionals and the tasks they are currently performing, there is considerable variation in employment contracts and the number of patient contacts, which varies from none to complete patient contact. Salaries and positions also vary among the nurse practitioners and physician assistants within an organisation. Criticising how different ambulance services position their nurse practitioners and physician assistants is tempting, but such criticism would be unfair, as a national framework has not been established. Each organisation has thus had to develop its own framework. Developing these frameworks means considering many different interests; each organisation must look at this positioning from a particular perspective. Finding a common denominator at the management, medical and organisational levels is crucial. Only then can a position be structurally developed for potential success. The implementation of the framework can support the hiring of nurse practitioners and physician assistants. Success stories of ambulance services for which the implementation went well can also support others and should thus be made accessible.

An ambulance service in the South Netherlands has implemented nurse practitioners even before the national framework was published and evaluated the impact of employing nurse practitioners in ambulance care on patient safety and patient experience compared to standard emergency medical service care. This IMPACT study (Ebben et al., 2020) could provide insight into whether the framework is applicable. If so, that evidence can provide additional input for integrating nurse practitioners and physician assistants in ambulance care throughout the Netherlands. However, since this fascinating study's results have not yet been published, they are not yet accessible and are not included in this study. This impact study can potentially support the national framework and provide clarity to other organisations that are still searching how to implement a nurse practitioner or physician assistants.

5. Conclusion

The study provides a first-time overview of all the nurse practitioners and physician assistants in Dutch ambulance care to consider how they are distributed over various ambulance services and what tasks they perform. We found 73 nurse practitioners and 20 physician assistants, 56 of whom participated as respondents. We also identified 30 nurse practitioners and physician assistants in training who will graduate in 2022 and 2023, thus increasing the total staff to 103 within a few years. There were many differences among the respondents in direct and indirect care task performance and the number of working hours. While some respondents were fully autonomous in-patient care, others were bound by regulations and restrictions. Again, while the established framework cannot currently function in the Netherlands, it can still provide clear guidance for ambulance services positioning their nurse practitioners and physician assistants. It could also be used as a basis for a corporate vision.

6. What is already known

- Various studies on the implementation of nurse practitioners and physician assistants have shown a higher quality of care, greater patient satisfaction and the possibility of reducing the workload of doctors and the direct costs of care.
- Dutch ambulance care has developed a framework with a clearly defined position for nurse practitioners and physician assistants to optimise their qualifications.
- Little is known about the nurse practitioners and physician assistants working in various ambulance services in the Netherlands.

7. What this paper contributes

- This study provides a first-time overview of all nurse practitioners and physician assistants in Dutch ambulance care.
- The framework that includes the job description for nurse practitioners and physician assistants cannot be used in the Netherlands. However, it can provide clear guidelines for ambulance services wanting to position their nurse practitioners and physician assistants.

Declaration of Competing Interest

None.

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