

ORIGINAL RESEARCH

Nurse practitioners substituting for general practitioners: randomized controlled trial

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Abstract

Title. Nurse practitioners substituting for general practitioners: randomized controlled trial.

Aim. This paper is a report of a study conducted to evaluate process and outcomes of care provided to patients with common complaints by general practitioners or specially trained nurse practitioners as first point of contact.

Background. Studies in the United States of America and Great Britain show that substituting nurse practitioners for general practitioners results in higher patient satisfaction and higher quality of care. As the American and British healthcare system and settings differ from that in the Netherlands, a Dutch trial was conducted.

Methods. A total of 1501 patients in 15 general practices were randomized to consultation by a general practitioner or a nurse practitioner. Data were collected over a 6-month period in 2006 by means of questionnaires, extracting medical records from practice computer systems and recording the length of consultations.

Findings. In both groups, the patients highly appreciated the quality of care. No statistically significant differences were found in health status, medical resource consumption and compliance of practical guidelines in primary care in the Netherlands. Patients in the NP intervention group were more often invited to re-attend, had more follow-up consultations and their consultations took statistically significantly longer.

Conclusion. Nurse practitioners and general practitioners provide comparable care. Our findings support an increased involvement of specially trained nurse practitioners in the Dutch primary care and contribute to knowledge of the effectiveness of care provision by nurse practitioners from a national and international perspective.

Keywords: general practitioner, nurse practitioner, outcomes, process, quality of care, randomized controlled trial, substitution

Introduction

Against the background of the need to increase service capacity, to meet rising demand and to improve access to primary care, a project was initiated to introduce the nurse practitioner (NP) role in Dutch general practices. At the start of the project in 2004, only five NPs worked in a general practice nationwide.

Background

In achieving an adequate mix of healthcare personnel (WHO 2000, Buchan & Dal Poz 2002), a need for NPs has been reported in the United States of America (USA), Europe, Canada, Australia and the Far East (Reay *et al.* 2003, McKenna *et al.* 2006). These developments contribute to an increase in service capacity that is needed to meet a rising demand, to overcome a shortage of physicians in certain settings, to improve the quality of care, to advance the careers of nurses and to reduce healthcare costs by employing the 'lowest cost provider'.

Recently, strong interest has been shown in the concept of NPs providing primary care. In this way, NPs may potentially substitute for doctors, particularly in the management of patients with minor health problems. The term NP is generally used to identify Registered Nurses with additional education and training, e.g. Master in Advanced Nursing Practice, who work within an expanded scope of practice that includes diagnosing, prescribing and treating medical conditions within specific settings (Reay *et al.* 2003).

Moreover, a systematic review of studies in primary care (Horrocks *et al.* 2002) has shown that NP consultation is likely to lead to high levels of patient satisfaction and high quality of care. Other studies demonstrated that nurse(s) (practitioners) give more information (Shum *et al.* 2000) and more advice on self-care and management (Kinnersley *et al.* 2000, Shum *et al.* 2000). Similar results have been found regarding health status (Kinnersley *et al.* 2000, Mundinger *et al.* 2000, Lenz *et al.* 2004), number of prescriptions ordered (Kinnersley *et al.* 2000, Venning *et al.* 2000) and health services utilization (Mundinger *et al.* 2000, Lenz *et al.* 2004).

However, these results mostly relate to Great Britain and the USA. Since the introduction of the NP in 1965 in the USA, the role has been expanded and diversified. In view of differences, such as the variability in autonomy of NPs (Offredy & Townsend 2000), level of education of NPs and characteristics of healthcare systems, there is a need for more research findings about NPs from other countries. In this Dutch trial, the effectiveness of NPs and general practitioners (GPs) in providing primary care, as first point of contact, was evaluated.

The study

Aim

The aim was to evaluate process and outcomes of care provided to patients with common complaints by GPs or specially trained NPs as first point of contact.

Design

A randomized controlled trial was conducted in 2006 in 15 general practices in the southern region of the Netherlands. Since NPs were appointed on a part-time basis, the trial took place on the days when GPs and NPs were both working in the practices. A flowchart of the study is shown in Figure 1.

Participants

A convenience sample was used and 12 NPs and 50 GPs participated in the trial. Table 1 shows the type of practice, their location, list size and the number of GPs in the 15 practices recruited.

At the start of this project, the role of the NP in the treatment of patients with common complaints was new for the Dutch setting. Therefore, a specific 2-year practice-oriented training programme was developed, which consisted of the Higher Professional Education Master's degree in Advanced Nursing Practice (MANP), including an academic course on managing common complaints. During the programme, the NPs were employed and facilitated by and educated in general practices. This trial took place 2 months after the NPs successfully completed the training programme.

A specified set of common complaints was compiled for which the patients seek medical attention. These common complaints will often lead to minor health problems. The NP sees patients with respiratory and throat problems, ear and nose problems, musculoskeletal problems and injuries, skin injuries, urinary problems, gynaecological problems and geriatric problems. The role of the NP involves assessing symptoms including physical examinations where appropriate, diagnosing and making decisions about further treatment, including writing prescriptions, referrals to primary or secondary services and clinical investigations. The NP has no full authority to prescribe medications and so the GP is always available for consultation and to validate prescriptions and referrals.

Before they started the NP training programme, the participants were all senior nurses with an average of 12 years (SD = 7.6 years) working experience as a (practice)

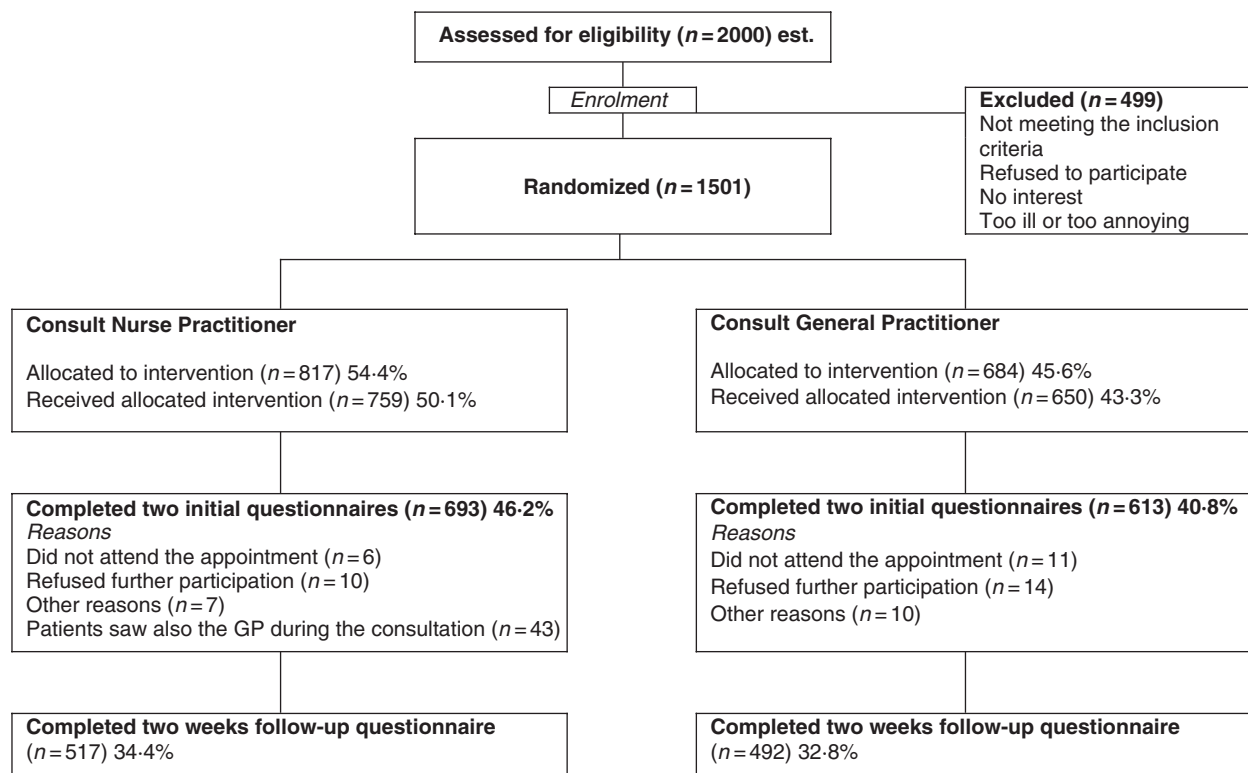


Figure 1 Flowchart of the study.

Table 1 Characteristics of the general practices (n = 15)

	Number of practices
Degree of urbanization	
< 5000	1
5000–30,000	4
30,000–100,000	4
> 100,000	6
Number of general practitioners	
1	3
2	2
3	3
4	2
5	5
Practice list size	(n = 79,310)
2000–4000	5
4000–6000	4
6000–8000	2
8000–10,000	1
10,000–12,000	3

nurse in general practice (n = 4), in a hospital (n = 3), home care (n = 2), a drug addiction service (n = 1) or an asylum seekers' centre (n = 2). The GPs had an average work experience of 16 years (SD = 10.1). The NPs worked part-time (0.6 full-time equivalent).

Patients who attended in general practice for an appointment during the study period were assessed for inclusion. Those aged over 16 years and coming for an initial consultation were invited to participate in the trial if they asked for an appointment on a day when the NP was present and had time available in the schedule. The patients were randomized and allocated to either the NP intervention group (NP-led care) or the reference group (GP-led care). Sequentially-numbered sealed envelopes containing randomized assignments to the two groups were provided by an independent person. The codes were generated from random number tables.

In each practice, a research assistant explained the project to patients as they arrived for their appointment and informed consent was obtained. Patients were excluded from the study if one or more of the following criteria applied: those who were not registered in the practice, had language or reading problems, were children under 16 years of age, came for a follow-up consultation and/or did not give the reason for the appointment to the recruiter.

Data collection

Data were collected by means of three questionnaires and from the computer systems of the practices. Patients filled in their own questionnaires before the consultation (T0),

directly after the consultation (T1) and two weeks after the consultation (T2). The first and second questionnaires (T0, T1) were completed prior to leaving the practice. The third questionnaire (T2) was sent and returned by post. It took patients approximately five minutes (T0) to ten minutes (T1 and T2) to complete the questionnaires.

Demographic information and data on diagnoses, prescriptions, referrals and investigations were extracted from the computer systems. The questionnaires were coded in a manner that allowed the data to be merged with that obtained from the computer system. Patients were assured that only the researcher would see data at the individual level.

Demographic information and health status

Demographic data, such as gender, age and diagnoses, were derived after recruitment of patients. At T1, patients were asked using a questionnaire if they had (had) any (chronic) diseases. These were recorded according to the Health and Labour Questionnaire (van Roijen *et al.* 1996).

Patient perceptions of quality of care

A self-completion patient measurement tool was used to measure patient perceptions of quality of care. The 12 items, which were partly derived from a validated instrument (Wensing *et al.* 1997) and a questionnaire developed for patients seeking 'same day' consultations (Kinnersley *et al.* 2000), were related to communication, attitude, provision of information and overall satisfaction. Responses were scored on a Likert-type scale: 6 was 'excellent' and 1 was 'poor'. Patients reported if the practitioner to whom they were assigned was the right professional to treat their illness (T1).

Effectiveness of the consultation and follow-up consultations

At baseline (T0) and two weeks after the consultation (T2), patients recorded the burden of their illness and their current level of concern on Likert-type scales (scale 0–10) (Kinnersley *et al.* 2000). Data about health status were collected using the EQ-5D, which patients completed at T0 and T2. The EQ-5D is a multi-attribute health status classification system to measure preferences for five attributes: mobility, self care, usual activity, pain/discomfort and anxiety/depression. The EQ5-D scores range between 0.00 (dead) and 1.00 ('full health') (Drummond *et al.* 2003).

Patients were asked in the questionnaire if they had been advised to re-attend (T1) and whether they had had a follow-up consultation (T2). They reported how they would deal with similar illnesses in the future: self managing the illness, consulting a GP, consulting an NP or having no preference for GP or NP (T2).

Duration of consultation

The research assistant recorded the length of each consultation using a stop-watch, starting from the moment the patient went into the consulting room of the NP or GP and stopping when the patient left the room. The duration included the time taken to prescribe drugs and interruptions. This objective timing of each individual consultation is regarded as the golden standard for measuring the time of duration of consultation (Wilson & Childs 2002).

Compliance with practice guidelines for general practitioners

To assess whether the quality of care was conform professional standards, a selection of 21 practice guidelines on minor health problems, derived by the Dutch College of General Practitioners (Braspenning & Schellevis 2004), was applied. These guidelines refer to the definition of the problem, the relevant history questions, clinical investigations, use of prescriptions and referrals. We investigated to what extent NPs and GPs followed the guidelines during the consultations and, where applicable, during follow-up consultations. The list of practice guidelines is available upon request from authors.

Medical resource consumption

Data were obtained about the consultations and the patient's presenting illness, prescriptions issued, investigations ordered and referrals to other healthcare professionals. For this purpose, every patient participating in the trial was identified on the practice computer system and the corresponding clinical notes were searched.

Finally, patients recorded (T2) if they had a follow-up consultation, how many consultations they had for the same problem, how many days they reported illness in their (paid) job and how many days they were prevented from performing daily activities.

Validity and reliability

To assure content validity, the questionnaires were discussed with two GPs with a background in research. The questionnaires were then tested with a group of 40 patients. This resulted in two textual refinements and asking the name of the practitioner instead of the type of practitioner (NP or GP) consulted.

Special attention was paid to ensuring the reliability of documentation by professionals. In each practice, information was given about the relevance of systematically recording medical data. Software was developed to extract data from the computer systems. The extracted data were used during meetings in the general practices to provide

feedback and for testing the reliability of their documentation. As a result, in one practice, the software for data extraction was adapted.

Ethical considerations

The study was approved by the appropriate ethics committee and patients were recruited and given information and assurances as described above.

Data analysis

Data from the questionnaires were coded and entered into a Microsoft Access 2000 database created for the study. The SPSS software version 12.0 (SPSS Inc., Chicago, IL, USA) was used to analyse the data.

No power calculation was performed as the number of participating practices was defined at the start of the project. This number was defined by the number of NPs being enrolled in the training programme.

Analyses were undertaken to compare patients within and between the groups (NP-led care or GP-led care) to which they were originally assigned. Any patient who was not initially seen by the GP or the NP at the point of randomization or who was seen by both professionals was excluded from the final analysis.

Descriptive statistics (percentage, mean and standard deviation, median, interquartile ranges, values of kurtosis and skewness) were calculated for all variables, and histograms with normal curves were plotted to ensure that the data were normally distributed. A two-tailed *t*-test was applied for continuous variables. For categorical variables, the chi-squared test for independent samples was used. The results are presented as treatment differences and 95% confidence intervals. A 5% statistical significance level was used throughout.

Results

It is estimated that 2000 patients attended the practice for a consultation; 499 met one or more exclusion criteria, declined to participate, had no interest or were too ill (See Figure 1). After randomization, 58 patients who were allocated to the NP intervention group and 47 patients in the reference group did not attend the appointment they had booked or refused to participate because of being too ill or not having an interest. A total of 1501 patients were enrolled for randomization; 817 (54.4%) were allocated to an NP and 684 (45.6%) to a GP. The two initial questionnaires (T0, T1) were completed by 1306 (87.0%) patients and 1009 (67.2%)

completed the postal questionnaire at T2. Data from medical records were available for 1397 patients (93.1%).

The patient demographics and main diagnosis categories are shown in Table 2. Most patients in the NP intervention group were aged between 26 and 45 years (41.5%) and in the reference group, most were aged between 46 and 65 years (36.9%). Those randomized to the GP were statistically significantly older (mean = 46.1, SD = 16.6) than those in the NP intervention group (mean = 42.8, SD = 16.5; $P < 0.001$).

The most frequently reported diagnoses were conditions of the throat, nose and ears/respiratory system (30.8%) and skin conditions (29.2%). Groups were comparable in terms of reported number of diagnoses.

Patients who returned all questionnaires were statistically significantly older (mean = 48.74, SD = 16.8) than those who did not (mean = 42.75, SD = 16.4; $P < 0.001$). There were no statistically significant differences in gender and type of diagnosis between patients with or without complete data.

No statistically significant differences were noted between patients in two groups in terms of other (chronic) diseases. In the NP intervention group, a higher prevalence of minor injuries (+3.6%), migraine (+3.1%), chronic skin injuries (+2.9%) and emotional distress (+2.4%) was recorded than in the reference group. In the reference group, a higher prevalence was notable for hypertension (+6.1%), diabetes (+3.0%), varicose veins (+2.7%), back injuries (+2.6%) than in the NP intervention group. No statistically significant differences in health status were measured between groups at baseline.

From Table 3, it can be seen that the items related to communication, attitude and provision of information (scored on a Likert-type scale from 1 to 6), were highly appreciated by patients from both groups (min = 5.46, max = 5.61). Comparable results were found in groups for the items related to the provision of information (min = 5.13, max = 5.42). No statistically significant difference in overall satisfaction was reported: the NP intervention group scored a mean of 8.19 (SD = 1.18) and the reference group a mean of 8.20 (SD = 1.26). Patients ($n = 583$) who reported at least one other (chronic) disease were statistically significantly more satisfied with a consultation of the NP (mean = 8.35, SD = 1.07). Patients in the reference group scored a mean of 8.11 (SD = 1.32; $P = 0.02$).

Patients from both groups equally regarded the NP or GP as the right professional to treat their illness ($P = 0.35$), equally said that they would visit their practitioner in the future ($P = 0.67$) and would recommend their professional to other patients if asked ($P = 0.41$).

Table 2 Demographic information and presenting diagnoses

Demographic information*	Total <i>n</i> = 1397 (%)	Nurse practitioner <i>n</i> = 747 (%)	General practitioner <i>n</i> = 650 (%)
Age (years)			
< 25	184 (13.2)	110 (14.7)	74 (11.4)
26–45	543 (38.9)	310 (41.5)	233 (35.8)
46–65	488 (34.9)	248 (33.2)	240 (36.9)
> 65	182 (13.0)	79 (10.6)	103 (15.8)
Gender			
Male	545 (39.0)	285 (38.2)	260 (40.0)
Female	852 (61.0)	462 (61.8)	390 (60.0)
Diagnoses ^{†‡}	<i>n</i> = 1232 (%)	<i>n</i> = 673 (%)	<i>n</i> = 559 (%)
Categories			
Conditions of the throat, nose and ears/respiratory system	379 (30.8)	210 (31.3)	169 (30.2)
Skin conditions	360 (29.2)	223 (33.2)	137 (24.5)
Musculoskeletal system	294 (23.9)	137 (20.4)	157 (28.1)
Sexually transmitted diseases	47 (3.8)	24 (3.5)	23 (4.1)
Contraception	20 (1.6)	16 (2.4)	4 (0.7)
Urinary tract infection	9 (0.7)	7 (1.0)	2 (0.4)
Other	123 (10.0)	56 (8.3)	67 (12.0)

*Based on complete case analysis; missing data: 12 patients in the NP intervention group 0 patients in the reference group.

[†]209 patients had more than one diagnosis.

[‡]Based on complete case analysis; missing data: 86 patients in the NP intervention group 78 patients in the reference group.

Table 3 Satisfaction after the consultation

	Nurse practitioner		General practitioner		Mean difference	<i>P</i>
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)		
Communication/attitude*						
Did he/she show that he/she understood your problem?	690	5.49 (0.88)	611	5.53 (0.79)	-0.04	0.41
How clearly did he/she tell you what the plan was?	689	5.48 (0.88)	610	5.50 (0.84)	-0.02	0.74
How clear was the explanation of the goals and procedure of the treatment?	692	5.51 (0.87)	612	5.52 (0.83)	-0.01	0.76
Are you convinced about the importance of the advice given?	692	5.46 (0.95)	611	5.53 (0.91)	-0.07	0.17
Were you able to speak about your problems and receive the appropriate attention?	689	5.61 (0.83)	613	5.60 (0.80)	0.01	0.78
Provision of information*						
Causes of problems/illness	688	5.13 (1.17)	612	5.21 (1.16)	-0.08	0.21
Relief of symptoms	687	5.33 (1.04)	614	5.37 (1.07)	-0.04	0.47
Duration of illness	683	5.20 (1.31)	608	5.28 (1.41)	-0.09	0.25
Reduce chance of recurrence	685	5.27 (1.53)	607	5.42 (1.62)	-0.15	0.08
What to do if your problem/illness persists	684	5.36 (1.24)	610	5.30 (1.51)	0.06	0.45
Overall satisfaction about this consultation**	683	8.19 (1.18)	609	8.20 (1.26)	-0.015	0.83

*Likert-scale 1–6.

**Likert-scale 0–10.

Two weeks after the consultation, patients in the NP intervention group reported that their symptoms had improved (mean = -1.77, SD = 3.18) and that their concerns

were reduced (mean = -1.51, SD = 3.20). Those assigned to the GP also reported (on a Likert-type scale from 0 to 10) an improvement in their symptoms (mean = -1.50, SD = 2.63)

Table 4 Effectiveness of the consultation

	Nurse practitioner		General practitioner		Mean difference	P
	n	Mean (SD)	n	Mean (SD)		
Before the consultation						
Burden of the illness*	745	3.85 (2.77)	622	4.06 (2.82)	0.21	0.17
Concerns about the illness*	744	4.64 (2.59)	622	4.77 (2.51)	0.13	0.35
EQ5-D**	723	0.82 (0.19)	595	0.80 (0.19)	0.01	0.41
Difference between before and two weeks after the initial consultation						
Burden of the illness*	473	-1.77 (3.18)	451	-1.50 (2.63)	0.27	0.16
Concerns about the illness*	476	-1.51 (3.20)	450	-1.40 (2.97)	0.11	0.60
EQ5-D	456	+0.05 (0.17)	415	+0.04 (0.15)	0.01	0.20

*Likert-scale (0–10).

and a reduction in concerns (mean = -1.40, SD = 2.97). No statistically significant between-group differences were noted in degree of burden ($P = 0.16$) or concerns related to the illness ($P = 0.60$). A small change was seen in health status, measured with the EQ5-D: at T0, the mean score between the two groups was not statistically significant (mean = 0.82, SD = 0.18 vs. mean = 0.80, SD = 0.18), but the NP intervention group showed an improvement of 0.05 (SD = 0.17) and the reference group an improvement of 0.04 (SD = 0.15, $P = 0.20$ at T2) (table 4).

Nurse practitioners were more likely to ask patients to re-attend (50.3%, $P = 0.001$), whilst these patients seemed to return statistically significantly more than those in the reference group (23.5%, $P = 0.04$). Patients in the NP intervention group reported that they would return because of continuing health problems or illness (59.6% vs. 46.9%, $P = 0.01$).

Of the 492 patients who consulted a GP and returned the follow-up questionnaire after 2 weeks, 19.8% stated that they would self-manage similar illness in the future, 42.1% would consult a GP for a similar illness in the future, 1.3% indicated that they would consult the NP and 25.1% had no preference for type of practitioner. Of the 517 patients who consulted an NP and returned the questionnaire, 19.4% stated that they would self-manage the illness in the future, 27.3% would consult a GP, 8.1% would consult an NP and 38.4% had no preference for type of practitioner. There was no statistically significant difference between the groups for these statements.

Nurse practitioners spent an average of 12.22 minutes (SD = 5.7) in face-to-face contact with patients, compared with 9.20 minutes (SD = 4.8) for GPs ($P < 0.001$).

For NPs, 179 consultations and from GPs, 126 consultations were available for analysing compliance in using the practical guidelines from the Dutch College of General Practitioners. No statistically significant differences were

found in compliance: NPs adhered to the guidelines in 79.8% of cases and GPs in 76.2%. The median in the NP intervention group was 86.6% vs. 93.6% in the reference group. The interquartile ranges were 45.8/100 in the NP intervention group and 50.0/100 for the reference group.

No statistically significant difference between groups occurred in percentage of prescriptions given ($P = 0.75$), investigations ($P = 0.55$) and referrals ($P = 0.24$) carried out (Table 5).

Of the number of the patients who had a follow-up consultation ($n = 210$), those from the NP intervention group returned on average 1.71 times for the same problem (SD = 0.82) and those from the reference group 1.66 times (SD = 0.89). These results were not statistically significantly different.

Patients from both groups reported absence from their paid job because of the illness of an average of 1.11 days (NP intervention group: SD = 0.32, reference group: SD = 0.31). Finally, there was no statistically significant difference between groups in the mean number of days patients reported being unable to perform their daily activities because of their illness (NP intervention group: mean = 2.53, SD = 2.89, reference group: mean = 2.69, SD = 2.90).

Discussion

In this study, we evaluated the process and outcomes of care provided by Dutch GPs or specially trained NPs at first point of contact. The results can be used for international comparisons with similar studies (Kinnersley *et al.* 2000, Mundinger *et al.* 2000, Venning *et al.* 2000). In these reports, no information was given about the work experience of the GP. The work experience of the NPs ranged from 1 to 5 years (Kinnersley *et al.* 2000, Venning *et al.* 2000). We compared newly-graduated NPs with GPs, an obvious but non-equivalent comparison. NPs who finished their education

Table 5 Medical resource use

	Nurse practitioner		General practitioner		P
	Number of patients	%	Number of patients	%	
1 prescription	411/747	55.0	352/650	54.2	0.75
2 prescriptions	126/747	16.9	127/650	19.5	0.20
≥3 prescriptions	66/747	8.8	51/650	7.8	0.51
Investigations carried out	18/747	2.4	19/650	2.9	0.55
Referrals	90/747	12.0	92/650	14.2	0.24
Asked to return	340/676	50.3	250/604	41.3	0.001*
Actually returned for the same problem	121/515	23.5	89/487	18.3	0.04*

*Statistically significant *P* value.

programme 2 months before the start of the study were compared with GPs with an average work experience of 16 years (*SD* = 10.1) and who had build confidential relationships with their patients.

Furthermore, patients in the reference group were statistically significantly older. As patients were randomized, we cannot explain this result. Patients who returned all the questionnaires were statistically significantly older, than those who did not. A possible explanation is that more participating patients did not have a paid job and/or experienced more time to participate in the trial.

Study limitations

This study gives an overall view of NPs employed in different types of practice, with a different degree of urbanization. We did not investigate the influence of the particular characteristics of practices on the results, for example the workload. The practices were comparable in their vision to educate and employ an NP and in receiving facilitation during the project (2004–2006).

The strengths of this study were the large sample size and the ability to randomize patients to equivalent providers. However, there were also several limitations.

In all practices, the recruiters mentioned that at times when they experienced a very high workload it was not always possible to assess patients for inclusion. Four practices did not accurately record the patients who were asked to participate in the trial. In the other practices, the mean percentage and standard deviation were calculated of patients who refused to participate and this was 25% (*SD* = 10.0). This percentage was extrapolated to the total group of 1501 included patients and thus it was estimated that 2000 patients were assessed for eligibility on the days that the NP and GP were both available. Because most of the patients knew the practitioners working in the practice

personally, it was not possible to blind them to the intervention.

Finally, the study had some characteristics that limit the generalizability of the results. The trial took place in one region, the NPs were senior nurses, were newly-graduated and the trial was conducted in general practices, which participated in a project to educate NPs as new professionals in primary care. These GPs can be seen as early adopters of innovations.

Discussion of results

Patients valued the care provided by NPs equally to that by GPs. Patients perceptions of the quality of care in the two groups were equal and they highly appreciated the communications, attitudes and the provision of information. In these items and in overall satisfaction with the consultation, no statistically significant differences between groups were found. Other researchers have found that patients are more satisfied with consultations by NPs (Kinnersley *et al.* 2000, Munding *et al.* 2000, Venning *et al.* 2000). Differences in educational level and/or work experience as an NP may possibly explain our findings.

Also, no statistically significant differences were found in patients' health status, medical resource consumption and in practitioners' compliance in using practical guidelines. As the NP role in Dutch general practices is new and will develop in the future, these results are comparable with other studies conducted in different settings and different healthcare systems, published several years ago (Kinnersley *et al.* 2000, Munding *et al.* 2000, Shum *et al.* 2000, Venning *et al.* 2000).

Nurse practitioners were more likely to ask patients to return. This can be explained by the fact that in the training programme the NPs are educated to ask every patient to return if the problem persists or becomes worse. Thus, those

What is already known about this topic

- Nurse practitioners may potentially substitute for general practitioners, particularly in the care of patients with minor health problems at first point of contact.
- Nurse practitioner consultations lead to high levels of patient satisfaction and high quality of care and do not differ from general practitioner consultations in health status, number of prescriptions ordered and health service utilization.

What this paper adds

- Patients highly appreciate the quality of care provided by nurse practitioners in Dutch primary care.
- No differences were found in health status, medical resource consumption and compliance with practical guidelines when compared with general practitioners.
- Patients seeing nurse practitioners were more often invited to re-attend, had more follow-up consultations and their consultations took statistically significantly longer.

Implications for practice and/or policy

- Nurse practitioners can be considered as the first point of contact for patients in general practice.
- Specialized education is needed to prepare practice nurses for the nurse practitioner role.

in the NP intervention group had statistically significantly more follow-up consultations. It is also possible that patients might feel less confident with an NP than with a GP and as a result would like to have extra checks for their complaints.

Among those who had seen a doctor, 26.4% had a preference for an NP or no preference if they had a similar illness in the future. Among those who had seen an NP, 46.5% had a preference for an NP or no preference for a GP or NP. This suggests that once patients have consulted an NP, they return to this type of practitioner for future problems. Regarding patient satisfaction, the effectiveness of the consultation and medical resource consumption, it might be expected that this percentage will grow when the NP role is more known in general practice and NPs develop in terms of work experience.

Nurse practitioner consultations were statistically significantly longer, but no difference was seen in the provision of information. This may be attributable to the booking

interval, which was 15 minutes for a consultation of a NP and ten minutes for a GP, and the fact that NPs were newly graduated and had less experience than the GPs. We have no data on whether NPs had a more holistic approach, as found by other researchers (Reveley 1998, Seale *et al.* 2006), who concluded that NPs use more social, emotional and patient-centred talk. GPs, on the other hand, confined themselves more to gathering information directly relevant to diagnosis and treatment (Redsell *et al.* 2007). Williams and Jones (2006) and Shum *et al.* (2000) found that time in consultations mattered to patients, whether this was time to discuss problems or time saved as a result of having issues resolved. Factors associated with the style and emphasis of consultations were also important.

Policy implications

This study lends support to an increased involvement of NPs in primary care, treating patients with common complaints at first point of contact. NPs provided care of equal quality to GPs and greater continuity of care would be expected when NPs work full-time.

These results were achieved by NPs who had followed a training programme, which equipped them to make both diagnostic and treatment decisions, in addition to the usual programme of the Master in Advanced Nursing Practice. This additional input is recommended to prepare the NPs for their specific role in primary care.

It cannot be assumed that similar results will be obtained by NPs working in different settings, with different groups of patients or with different level of education or experience.

The initiative reported in this paper was a first step in gaining acceptance the NP as a new professional in treating common complaints. How primary care is provided is an important policy question and depends on the extent to which NPs gain authority. The process of implementing and evaluating APN roles is as complex and dynamic as the roles themselves (Bryant-Lukosius & Dicenso 2004). Policymakers indicate support for advanced practice and the autonomy of NPs. The process of authorization (for example, writing prescriptions), however, has constraints, which not only support nurses' progress but also hinder it (Turner *et al.* 2007). A widespread national and international debate about the appropriate mix of skills in primary care is needed to develop greater understanding of the potential value of the NP role (Roodbol 2005), and in particular, the NP in general practice (Wilson *et al.* 2002, Laurant 2007). An economic evaluation of our project will be published in the future.

Conclusion

Nurse practitioners have been evaluated in other countries for more than 30 years now, but until now no evaluations studied NPs in Dutch general practices using a large scale, randomized controlled design. This study lends support to an increased involvement of specially trained NPs in Dutch primary care, treating common complaints and contributes to knowledge of the effectiveness of the NP as first point of contact in primary care from a national and international point of view.

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Author contributions

AD, JM, ED, CS and BV were responsible for the study conception and design. AD and BV performed the data collection. AD and BV performed the data analysis. AD and BV were responsible for the drafting of the manuscript. AD, JM, ED, CS and BV made critical revisions to the paper for important intellectual content. AD and BV provided statistical expertise. ED and BV obtained funding. JM, ED and BV provided administrative, technical or material support. JM, CS and BV supervised the study.

References

- Braspenning J. & Schellevis F. (2004) *Tweede Nationale studie naar ziekten en verrichtingen in de huisartsenpraktijk. Kwaliteit huisartsenzorg belicht*. NIVEL/WOK, Utrecht.
- Bryant-Lukosius D. & Dicenso A. (2004) A framework for the introduction and evaluation of advanced practice nursing roles. *Journal of Advanced Nursing* 48, 530–540.
- Buchan J. & Dal Poz M.R. (2002) Skill mix in the health care workforce: reviewing the evidence. *Bulletin of the World Health Organization* 80, 575–580.

- Drummond M.F., O'Brien B., Stoddart G.L. & Torrance G.W. (2003) *Methods for the Economic Evaluation of Health Care Programmes*, 2nd edn. Oxford University Press, Oxford.
- Horrocks S., Anderson E. & Salisbury C. (2002) Systematic review of whether nurse practitioners working in primary care can provide equivalent care to doctors. *British Medical Journal* 324, 819–823.
- Kinnersley P., Anderson E., Parry K., Clement J., Archard L., Turton P., Stainthorpe A., Fraser A., Butler C.C. & Rogers C. (2000) Randomised controlled trial of nurse practitioner versus general practitioner care for patients requesting "same day" consultations in primary care. *British Medical Journal* 320, 1043–1048.
- Laurant M. (2007) *Changes in Skill Mix. The Impact of Adding Nurses to the Primary Care Team*. Centre for Quality of Care research (WOK), Nijmegen.
- Lenz E.R., Munding M.O., Kane R.L., Hopkins S.C. & Lin S.X. (2004) Primary care outcomes in patients treated by nurse practitioners or physicians: two-year follow-up. *Medical Care Research and Review* 61, 332–351.
- McKenna H., Richey R., Keeney S., Hasson F., Sinclair M. & Poulton B. (2006) The introduction of innovative nursing and midwifery roles: the perspective of healthcare managers. *Journal of Advanced Nursing* 56, 553–562.
- Munding M.O., Kane R.L., Lenz E.R., Totten A.M., Tsai W.Y., Cleary P.D., Friedewald W.T., Siu A.L. & Shelanski M.L. (2000) Primary care outcomes in patients treated by nurse practitioners or physicians: a randomized trial. *Journal of the American Medical Association* 283, 59–68.
- Offredy M. & Townsend J. (2000) Nurse practitioners in primary care. *Family Practice* 17, 564–569.
- Reay T., Golden-Biddle K. & Germann K. (2003) Challenges and leadership strategies for managers of nurse practitioners. *Journal of Nursing Management* 11, 396–403.
- Redsell S., Stokes T., Jackson C., Hastings A. & Baker R. (2007) Patients' accounts of the differences in nurses' and general practitioners' roles in primary care. *Journal of Advanced Nursing* 57, 172–180.
- Reveley S. (1998) The role of the triage nurse practitioner in general medical practice: an analysis of the role. *Journal of Advanced Nursing* 28, 584–591.
- van Roijen L., Essink-Bot M.L., Koopmanschap M.A., Bonsel G. & Rutten F.F. (1996) Labor and health status in economic evaluation of health care. The Health and Labor Questionnaire. *International Journal of Technology Assessment in Health Care* 12, 405–415.
- Roodbol P. (2005) *Dwaallichten, struikeltochten, tolwegen en zangsporen: onderzoek naar taakherschikking tussen verpleging en artsen*. University of Groningen, Groningen.
- Seale C., Anderson E. & Kinnersley P. (2006) Treatment advice in primary care: a comparative study of nurse practitioners and general practitioners. *Journal of Advanced Nursing* 54, 534–541.
- Shum C., Humphreys A., Wheeler D., Cochrane M.A., Skoda S. & Clement S. (2000) Nurse management of patients with minor illnesses in general practice: multicentre, randomised controlled trial. *British Medical Journal* 320, 1038–1043.
- Turner C., Keyzer D. & Rudge T. (2007) Spheres of influence or autonomy? A discourse analysis of the introduction of Nurse Practitioners in rural and remote Australia. *Journal of Advanced Nursing* 59, 38–46.

- Venning P., Durie A., Roland M., Roberts C. & Leese B. (2000) Randomised controlled trial comparing cost effectiveness of general practitioners and nurse practitioners in primary care. *British Medical Journal* **320**, 1048–1053.
- Wensing M., Grol R., Asberg J., van Montfort P., van Weel C. & Felling A. (1997) Does the health status of chronically ill patients predict their judgements of the quality of general practice care? *Quality of Life Research* **6**, 293–299.
- WHO (2000) *The World Health Report 2000. Health Systems: Improving Performance*. World Health Organization, Geneva.
- Williams A. & Jones M. (2006) Patients' assessments of consulting a nurse practitioner: the time factor. *Journal of Advanced Nursing* **53**(2), 188–195.
- Wilson A. & Childs S. (2002) The relationship between consultation length, process and outcomes in general practice: a systematic review. *British Journal of General Practice* **52**, 1012–1020.
- Wilson A., Pearson D. & Hassey A. (2002) Barriers to developing the nurse practitioner role in primary care—the GP perspective. *Family Practice* **19**, 641–646.

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