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NURSING ROLES

Is it economically viable to employ the nurse practitioner in general practice?

Angelique TM Dierick-van Daele, Lotte MG Steuten, Arla Romeijn, Emmy WCC Derckx and Hubertus JM Vrijhoef

Aims. This article provides insight into the potential economic viability of nurse practitioner employment in Dutch general practices.

Background. General practitioners face the challenging task of finding the most efficient and effective mix of professionals in general practice to accommodate future care demands within scarce health care budgets. To enable informed decision-making about skill mix issues, economic information is needed.

Design. Discursive paper.

Method. A descriptive and explorative design was chosen to study the economic viability of nurse practitioner employment in general practice. The conditions under which the nurse practitioner is able to earn back his/her own cost of employment were identified. Preferences and expectations of general practitioners and health insurers about nurse practitioner reimbursement were made transparent.

Results. Although general practitioners and health insurers acknowledge the importance of the nurse practitioner in accommodating primary care demands, they have polarised views about reimbursement. The employment of nurse practitioners is seldom economically viable in current practices. It requires a reallocation of (80% of) the general practitioner's freed up time towards practice growth (12% number of patients).

Conclusion. The economic viability of the nurse practitioner has proven difficult to achieve in every day health care practice. This study provided insight into the complex interaction of the (cost) parameters that result in economic viability and feeds a further discussion about the content of the nurse practitioner role in general practice based on optimal quality of care vs. efficiency.

Relevance to clinical practice. Effective and efficient health care can only be provided if the actual care needs of a population provide the basis for deciding which mix of professionals is best equipped to deal with the changing and increasing demand of care. A macro-level intervention is needed to help a broad-scale introduction of the nurse practitioner in general practice.

Key words: economic perspective, general practice, nurse practitioner, nursing, skill mix, substitution

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Introduction

A large variety of health care professionals are working in the health care system. History and tradition over the years have determined how tasks and responsibilities are divided between these professionals. However, the increased pressure on health care services because of major demographic, epidemiological, socio-cultural, societal, scientific and technological developments have led to a rearrangement of traditional role boundaries between staff groups. A recent example is the nurse practitioner (NP). NPs have been working in the Dutch health care context since 1997. The large majority of them are employed in hospitals. The NP has only recently been introduced to primary care in the Netherlands, with the purpose to increase service capacity and improve access to primary care.

To create an evidence base for the efficiency and effectiveness of this new professional in primary care, an extensive five-year evaluation study (NP in general practice study or NPGP study) was set up (Derckx 2005, 2006). This article, as part of the NPGP study, focuses on questions concerning the economic viability of NP employment in general practice (from a general practice perspective). As general practitioners (GPs) increasingly face the challenging task of finding the most efficient and effective mix of professionals in general practice to accommodate future care demands within scarce health care budgets, economic information is needed to support informed decision-making.

The aim of this article is to identify the conditions under which the NP is able to earn back his/her own cost of employment through productivity (consultations) or capacity (patients) increase. A second aim was to clarify perceptions and expectations of central stakeholders – GPs and health insurers – with respect to this topic.

Background

Many studies have focussed on the effectiveness of the NP. A systematic review of studies in primary care (Horrocks *et al.* 2002) found evidence that NP consultation is likely to lead to high levels of patient satisfaction and high quality of care. Other studies found 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 were found regarding health status (Kinnersley *et al.* 2000, Mundinger *et al.* 2000, Lenz *et al.* 2004), the number of prescriptions ordered (Kinnersley *et al.* 2000, Venning *et al.* 2000) and health services usage (Mundinger *et al.* 2000, Lenz *et al.* 2004). These results mostly represent health care practices in the

UK and the USA, where the NP role has been expanded and diversified, since its introduction in the 1960s. Given the considerable differences between countries in autonomy of NPs (Offredy & Townsend 2000), level of education of NPs and characteristics of health care systems, there is a need for more comparative research about the role and potential value of NPs from other countries.

The NPGP study was the first of its kind in the Netherlands. The study entailed an evaluation of process and outcomes of care provided to patients with common complaints by GPs or specially trained NPs as first point of contact. It confirmed previous study outcomes that in treating patients with common complaints, NPs provide equal quality of care as GPs (Dierick-van Daele *et al.* 2009). Box 1 shows a job description of the NP in Dutch general practices.

Questions surrounding the efficiency of care by NPs, however, remained. Previously, several authors (McGrath 1990, Richardson 1999, Horrocks *et al.* 2002, Laurant *et al.* 2005, Dierick-van Daele *et al.* 2008) emphasised the lack of attention for the economic viability of NPs and stressed the methodological limitations of studies concerned. One recent economic analysis concluded that employing a NP in primary care in the UK is likely to cost much the same as employing a salaried GP (Hollinghurst *et al.* 2006). Yet, the inconsistent use of the term 'NP', the different contexts where the studies took place, the variety in case mix, tasks, education and experience of the NPs, as well as the differences in economic methods used, hamper direct comparability and broader generalisability of these study's outcomes. Hence, there was a need for additional research to create an evidence base in the Dutch health care context. The NPGP study was the first to do so; it compared costs of NP consultations vs. GP consultations (Dierick-van Daele *et al.* 2010) in Dutch primary care. The authors concluded that NPs can provide care at lower costs. In the NPGP study, the question rose whether this information alone would be enough to help GPs make informed decisions about skill mix change. Given the nature of NP employment in Dutch general practice (NP often is not employed to fully replace a GP but is often added to an existing general practice team), an additional, broader and more pragmatic type of economic evaluation seemed to be called for. Providing GPs solely with a cost-effectiveness analysis, that is, a comparison of costs per effect of the GP vs. that of a NP, would leave important questions unanswered from a general practice point of view. If indeed, given the growing and changing demands in health care, general practices are faced with a decision which professional to add to their practice, more economic information is needed to unveil under which specific conditions it is economically

Box 1 Nurse practitioner (NP) in Dutch general practices

Target population: patients with common complaints

A specified set of common complaints was compiled for which patients seek medical attention. These common complaints will often lead to minor health problems. Patients have respiratory and throat complaints, ear and nose complaints, musculoskeletal complaints and injuries, skin injuries, urinary complaints, gynaecological complaints and geriatric problems

Patient-related activities

Based on triage by the practice assistant, patients with common complaints are referred to the NP. The NP works independent during consultations and home visits. The activities, according to practice guidelines derived by the Dutch College of General Practitioners are assessing symptoms, physical examinations where appropriate, diagnosing and making decisions for further treatment, prescriptions, referrals to primary or secondary services and clinical investigations. The NP has no full authority to prescribe medications, the general practitioner is always available for consultation and to assign prescriptions. The NP has access to the electronic medical records and reported consultations

Non-patient-related activities

NPs perform activities to improve collaboration between health care professionals within general practice and external partners and activities related to education and quality care projects.

Training

A specific two -year practice-oriented training program was developed, which consisted of the Higher Professional Education Master's degree in Advanced Nursing Practice (MANP), including general courses and medical courses on a specified set of managing common complaints. General courses were training of basic medical skills, role development, collaboration, context of care and research.

Areas and competencies formulated in the training program

1. Patient care:

Analyses and interprets patients'(and relatives') history, including presenting symptoms, physical findings and diagnostic information to develop appropriate diagnoses (in a multidisciplinary way);
Diagnoses and manages conditions, prioritises health problems and intervenes appropriately including initiation of effective emergency;
Formulates an action plan based on scientific rationale, evidence-based standards of care and practice guidelines, provides guidance and counseling regarding management of the health/illness condition.

2. Collaboration:

Coordinates the patients' treatment, if necessary, initiates appropriate and timely consultation and/or referral when the problem exceeds the NP's scope of practice and/or expertise;
Initiates a professional collaboration with patients and other health care professionals.

3. Quality Care:

Improves the quality of care by means of research and implementing evidence based practice;
Educates and coaches other professionals to improve their skills.

viable to employ such a professional. The term 'economic viability' refers to the NP's ability to earn back his/her cost of employment by means of an increase in production (consultations) and/or capacity (patients) in general practice (Derckx 2005, 2006). From a general practice's perspective, it should result in at least a cost-neutral employment, achieved without additional reimbursements.

Several stakeholders play a role in the introduction of NPs in general practice. The triangular relationship between health care consumer, health care provider and health insurers (Van der Maas & Mackenbach 1999) was identified as the main framework for describing the cost and reimbursement of NP employment in Dutch general practice (Fig. 1). The Dutch Ministry of Health has a steering role when it comes to new developments in health care. However, despite the Ministry's responsibility for adequate quality, accessibility and affordability of care, no structural initiatives have been taken so far to tackle problems related to reimbursement of new professionals in health care.

Methods

Preferences and expectations of NP employment

Given the nature of the study objectives, a descriptive, explorative, study design was chosen and carried out in 2008. Data collection and data analysis were of a quantitative nature. The full operational population of GPs employing a NP ($n = 132$) and health insurers ($n = 12$) in the Netherlands received the first questionnaire asking for their preferences and expectations with respect to NP employment and reimbursement.

A second questionnaire confronted both GPs and health insurers with the most relevant outcomes of the economic viability of the NP, estimated by a developed economic model. The questions were related to the respondent's acceptability of the study outcomes and the perceived feasibility of the percentage of practice growth that is suggested.

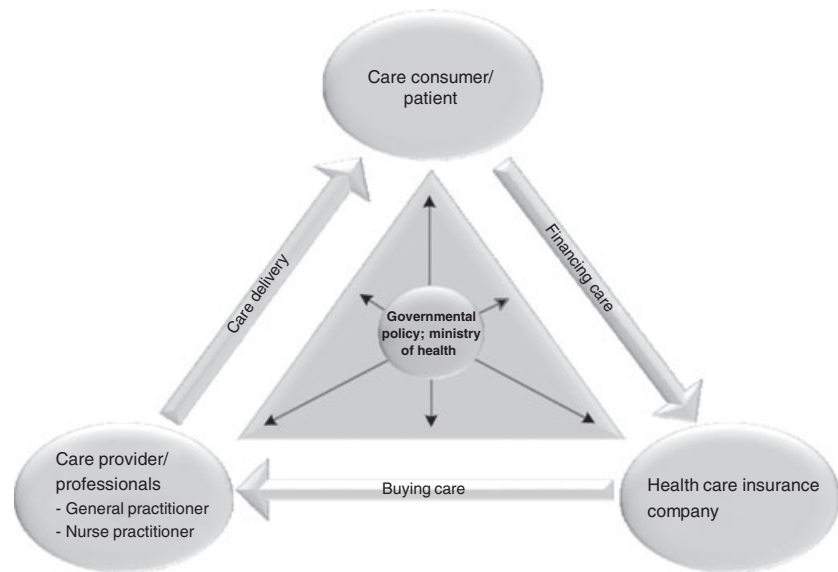


Figure 1 The stakeholder model (Van der Maas & Mackenbach 1999).

Questionnaire data were analysed in SPSS 16.0 (descriptive statistics; *t*-tests, $p \leq 0.05$; and Pearson's chi-square tests). Respondents with more than 10% missing values were excluded from the analysis. For those cases with <10% missing values, the missing value was replaced by an average item score of the applicable respondent group.

Developing an economic model to estimate the economic viability

When estimating the economic viability of the NP, several parameters need to be taken into account. Therefore, parameter inputs were used as collected from the first questionnaire.

The perspective taken in any economic evaluation determines the (cost) parameters that need to be considered. In this study, a general practice perspective was taken, which means that costs of training are excluded as these are considered to be only relevant when taking a societal perspective (Hollinghurst *et al.* 2006). A semi-structured literature review accommodated the identification of the parameters to be included in the economic model to estimate the economic viability of NP employment (Table 1).

Five main assumptions underlie the economic model: (1) growth of the general practice is possible. This assumption allows for calculating what percentage of growth is necessary for the NP to earn back his/her cost of employment; (2) the employment of the NP does not generate a significant structural increase in expenditure of the amount of the yearly general practice cost; (3) the NP's availability in general practice is guaranteed (available when needed); (4) the quality of care of the NP is equal to that of the GP

(Dierick-van Daele *et al.* 2009); (5) resource usage of the NP in terms of the number of return visits, prescriptions, additional diagnostic tests and referrals is equal to that of the GP (Dierick-van Daele *et al.* 2009).

The starting point of the economic model is a general practice for which the total number of GPs (full-time equivalent; FTE GP), number of patients and general practice gross revenue is described, based on the price year 2007. The revenue is then re-estimated to represent a value of gross revenues as if the NP was not yet employed in this practice. Based on the percentage of patient-related tasks performed by the GP, the total time that is spent on patient care is estimated, as well as revenues per patient. Next, based on data found in the questionnaire with respect to substitution of tasks (sum of both patient-related and non-patient-related tasks), it is estimated how much patient-related time could be transferred to a NP if the GP should decide to employ this professional in his/her practice. Taking into account the time needed for supervision, the inefficiency ratio of the NP (the NP's consultation time is longer than that of the GP) as well as the fact that the NP does not spend 100% of his/her time on patient-related tasks, an estimation is made of the actual hours that a NP can spend on patient-related tasks and the full-time equivalent (FTE) NP that is needed for these activities. Subsequently, the cost of the NP in terms of annual salary is introduced into the model. Finally, the fact that not all GPs dedicate the freed up time, as accrued by substituting tasks to the NP, for 100% to patient care is taken into account. This is a crucial factor, because it affects the possible growth of the general practice. The model outcome is the difference between the growth in revenue of the practice and the cost of the NP. This metric indicates the percentage of

Table 1 Parameters in the economic model to estimate the economic viability of nurse practitioner (NP) employment

Parameter	Input value*	Source	Range initial one-way sensitivity analysis [†]	Final model sensitivity analysis/test range
FTE (Full-time equivalent) general practitioner and working hours per FTE	1 FTE GP = 45 hours/week; Hours on call duty = five hours/week; working weeks = 45/year FTE GP in average (<i>n</i> = 10) practice: 2, 8 FTE	(Van den Berg <i>et al.</i> 2004) Questionnaire	Fixed	Fixed
% Patient-related hours of general practitioner	70%	Questionnaire	Fixed	Fixed
Gross revenue general practice (Euro) per year (excl. standard practice cost)	Total gross revenue: €760,029/year (price year 2007) Estimated gross practice cost: 51% of total gross revenue	Questionnaire (http://www.ctg-zaio.nl)	Fixed	Fixed
Number of patients in general practice (based on the mean of 2, 8 FTE general practitioner per practice)	6603 patients (based on 2007)	Questionnaire	Fixed	Fixed
% Substitution (% of patient-related + non-patient-related tasks from general practitioner to NP)	15%	Questionnaire	Range 10–60%	Fixed
% Supervision needed	5%	Questionnaire	Range 4–15%	Fixed
Inefficiency % (consultation times of NP are longer than that of general practitioner)	33%	Questionnaire	20–100%	Fixed
% ratio of total tasks of NP that consists of substituted tasks and complementary tasks	Substitution tasks: 77% Complementary tasks: 23%	Questionnaire Questionnaire	50–100% 0–50%	Fixed
NP Salary cost per year (per one FTE = 38 hours/week in Euros)	€59,426	Questionnaire	Fixed	Fixed
FTE and working hours of NP	1 FTE NP = 38 hours/week; vacation: 166 hours; national holidays = seven days; sickness absence: 5% FTE NP in average (<i>N</i> = 10) practice: 0, 6 FTE	Questionnaire (Collective Employment Agreement General Practitioners 2005)	Fixed	Fixed
Use of freed up time by general practitioner, split in: % patient-related tasks, (regular complexity and higher complexity), % non-patient-related tasks, % free time	% time patient-related tasks, regular complexity: 27% % time patient-related tasks, higher complexity: 15% % time non-patient-related tasks: 45% % free time: 13%	Questionnaire	0–100 [‡]	Threshold 39–100% [‡]

*Questionnaire results represent average score based on *n* = 10 (general practices).

[†]Range based on literature data and actual questionnaire outcomes.

[‡]Patient-related tasks (with same complexity).

GP, general practitioner.

general practice growth that is currently achieved and the net gain or loss associated with this. To deal with uncertainty in relation to data inputs and to attempt to increase the generalisability of the study, the economic viability was estimated by means of a one-way sensitivity analysis and a threshold analysis in Excel 2003 (Briggs *et al.* 1994).

First, a one-way sensitivity analysis was performed to identify the parameters that influence the economic viability of the NP the most. The variables of importance, as well as the variety range applied in the one-way sensitivity analysis, were chosen based on what literature considers to be relevant and feasible. These variables were percentage of substitution

(Richardson *et al.* 1998, Bussemakers 2005a,b), percentage of supervision (McGrath 1990, Richardson *et al.* 1998, Bussemakers 2005a,b), the percentage of inefficiency (Richardson 1999, Laurant *et al.* 2005, Dierick-van Daele *et al.* 2009), % ratio of total tasks of NP that can truly be considered substituted tasks and/or complementary tasks (Richardson & Maynard 1995, Richardson *et al.* 1998) and the use of freed up time by GPs [Richardson 1999, RVZ (Council for Public Health and Health Care) 2002].

Next, a threshold analysis was performed. Goal variables were practice growth in terms of patients and subsequent reallocation of GP's freed up time needed to achieve both a cost-neutral (NP is economic viable) or revenue scenario. By setting the net added result to zero, we simulated the necessary practice growth and the needed allocation of freed up GP time (in terms of patient care, same complexity). To calculate the maximum potential revenue, we set the reallocation of freed up GP time to 100% (all of the freed up time goes towards practice growth) and we simulated the assumed practice growth.

Results

Preferences and expectations of NP employment

Data analysis showed the following outcomes relevant in the discussion about the economic viability of the NP. Response rates for the first questionnaire were 46% among

GPs and 58% among health insurers. Under the current financial structure, three out of 17 general practices are able to fully earn back the cost of NP employment. In all other practices, NP employment is not (yet) economically viable. In those practices, no additional reimbursements are available ($n = 4$), practice nurse reimbursements are used for NPs employment ($n = 7$) or some other form of reimbursements are used such as a partial replacement of GP ($n = 3$). The preferences and expectations of GPs ($n = 61$) and health insurers ($n = 7$) regarding NP employment and reimbursement are shown in Table 2.

Both stakeholders indicate that the NP has an important role in accommodating future care demands in primary care and that the NP could best be financed by making sure that the NP is able to (at least) earn back his/her own cost of employment. GPs further indicated that they would like the existing reimbursements for practice nurses to be extended to NPs. Table 2 also shows that GPs perceive health insurers to be responsible for the reimbursement of the NP if they want this professional to become a structural provider of primary care. Health insurers have a significantly different ($p = 0.023$) opinion on this topic and meanwhile overestimate GPs' willingness to contribute to NP reimbursement ($p = 0.021$). Furthermore, whereas GPs would welcome a general budget, allowing them to decide for themselves which type of professional to employ based on the demand of care, health insurers are united in their opinion against this ($p < 0.001$).

Table 2 Average scores of GPs and health insurers per statement

Item*	Health insurers	GPs
	$n = 7$ Mean (SD)	$n = 61$ Mean (SD)
I see possibilities for NP reimbursement by using additional practice income	-0.43 (1.62)	-0.11 (1.27)
I think that health insurers will reimburse NP if NP cannot fully earn back own employment cost	-0.43 (0.98)	-0.03 (1.15)
I am willing to contribute to NP reimbursement within my own practice [†]	0.86 (0.69)	0.03 (1.33)
There should be a separate tariff for the NP	0.71 (1.38)	0.25 (1.36)
Sufficient growth of my practice is possible so that NP can earn back employment cost	0.14 (0.69)	0.26 (1.18)
I do not object to growth of my practice, to allow NP to earn back employment cost	0.57 (1.27)	0.34 (1.45)
The government should play a more active role in solving issues related to NP reimbursement	-0.14 (1.57)	0.75 (0.98)
NP reimbursement can best be realised by letting NP earn back own employment cost	1.43 (1.13)	0.90 (1.11)
It is the responsibility of health insurers to reimburse the NP [†]	0.00 (1.29)	0.97 (1.02)
I would welcome the idea to use the additional practice income originally meant for practice nurses, for NP employment/reimbursement	0.71 (0.95)	1.02 (1.15)
Other GPs will employ a NP, if it leads to financial benefits	0.71 (0.95)	1.18 (0.70)
A broad budgeting system should allow general practices to select personnel based on care demand [†]	-1.00 (1.15)	1.49 (0.72)
The NP has a role in creating primary care that is able to deal with future care demands	1.43 (0.79)	1.51 (0.83)

*5-point Likert scale: -2: totally disagree; 2: totally agree.

[†]Significant differences health insurers vs. GPs ($p < 0.05$).

GPs, general practitioners; NP, nurse practitioner.

Economic viability of the NP estimated by means of the economic model

Table 3 shows the estimated economic viability of NP employment, based on data from 10 general practices, including small (solo/duo) general practices ($n = 4$) and (group) general practices ($n = 6$). Both the current situation and the practice growth conditions needed to achieve a cost-neutral or revenue-generating scenario are presented.

On average, NP employment is currently not economically viable. This is expressed by the negative value of the gross revenue. The initial one-way sensitivity analysis, followed by the threshold analysis, showed that this economic loss is mainly because of the relatively low allocation of freed up time of GPs towards practice growth. In the average general practice, 27% of the freed up time is used for practice growth. Furthermore, 15% of the freed up time is used for quality improvement (treating more complex patients). A relatively high percentage of the freed up time (45%) is allocated towards more non-patient-related activities and 13% towards leisure time.

In an average-sized practice, NP employment would be cost-neutral when 12% practice growth is realised in terms of number of registered patients. To achieve this, 80% of the freed up time should be allocated towards practice growth. The required practice growth, however, depends on the size of the general practice and is lower in small (solo/duo) practices and higher in group practices. In small practices, a growth of 8% would suffice to arrive at a cost-neutral employment of the NP. For this 56% of GP, freed up time should be allocated towards practice growth. In group practices, a growth of 13% in number of registered patient is required to pay off NP employment, which demands a

reallocation of 92% of freed up time towards practice growth only.

In an ideal situation, where the general practices allocate 100% of the freed up time towards practice growth, the net added revenue achieved amounts to an average of €9975 Euro. This scenario translates in 15% practice growth in terms of registered patients.

Notwithstanding the small study size ($n = 10$) calls for caution in making generalisations, and further analysis was performed to try to explain the difference in outcomes between small (solo/duo practices; ≤ 2 FTE GP) vs. larger (group practices; > 2 FTE GP). This analysis showed that the average gross revenue per FTE GP (after deduction of cost for practice personnel; NP, general practice nurse, general practice assistant) is higher in small vs. larger practices. Smaller practices (in terms of FTE GPs) seem to economically perform better than larger practices. The practice revenue minus salary cost of practice personnel per FTE GP correlates significantly and negatively (corr: -0.752 , sign two-tailed: 0.012) with FTE GP.

The general practices that economically perform better than others do so without a significant difference in consultations per patient (a mean of three consultations per patient per year). Correlation analysis also shows that the number of consultations per FTE NP is negatively correlated to the number of patients (corr: -0.641 , sign. two-tailed: 0.046) in general practice and positively correlated to the revenue per patient (corr: 0.719 , sign. two-tailed: 0.019). To summarise; smaller general practices are able to generate more revenue per patient without a significant higher number of consultations.

Finally, when looking at the production parameters of the NP, the following picture emerges. In an average practice

Table 3 Economic viability nurse practitioner employment

	Average general practice ($n = 10$)	Small (solo/duo) general practice ($n = 4$)	Large (group) general practice ($n = 6$)
Current situation			
Net added result variable general practice revenue	27,342 €	7706 €	43,603 €
Allocation freed up time practice towards growth*	27%	25%	28%
Assumed practice growth (in terms of patients)	4%	4%	4%
Neutral net added result for revenues			
Net added result variable general practice revenue	–	–	–
Allocation freed up time practice towards growth†	80%	56%	92%
Assumed practice growth (in terms of patients)	12%	8%	13%
Maximal net added result revenues			
Net added result variable general practice revenue	9975 €	11,074 €	5355 €
Allocation freed up time practice towards growth†	100%	100%	100%
Assumed practice growth (in terms of patients)	15%	15%	14%

*Reallocated towards patient care (same complexity), reallocation towards more complex patients not included.

†Calculated in terms of patient care with same complexity only.

($n = 10$), 77% of the NP's time is spent on substituted tasks, 23% on complementary tasks. In smaller practices, this differs, a higher percentage of NP tasks consists of substituted tasks (85%), leaving less room for complementary tasks (15%). In group practices, this ratio of substituted vs. complementary tasks is 72% vs. 28%. Inefficiency of the NP (longer consultation time of NP vs. GP) is lower in smaller practices (on average 30% in smaller practices vs. 34% in larger practices), and the number of consultations per FTE NP is higher (on average 4329.6 per FTE NP per year in small practice vs. 3003.2 per FTE NP per year in larger practices).

When confronting GPs and health insurers with the main study outcomes and requesting their comments (response rates: 35% GPs; 58% health insurers), both stakeholder groups acknowledge that the cost-neutral scenario for NP employment is currently seldom achieved in general practice. The estimation that 80% of the GP's freed up time should be reallocated towards practice growth to achieve such a cost-neutral scenario is accepted as accurate by the majority of the respondents. GPs tend to be slightly more negative than health insurers about the feasibility of the required 12% practice growth for achieving a cost-neutral employment scenario. GPs would also like to see all NP tasks reimbursed. Currently, 23% of NP tasks are complementary; these include tasks that are not previously performed by the GP, but are considered important to improve the quality of the care. These activities are often related to education, quality improvement projects or research. Health insurers significantly disagree ($p < 0.001$) with this opinion.

Discussion

As GPs increasingly face the challenging task of finding the most appropriate mix of professionals for their general practice, questions about the economic viability and reimbursement of the NP in general practice can no longer be ignored. Although GPs and health insurers argue that, ideally, the NP should be able to earn back his/her own cost of employment, this is seldom the case. This study has shown that NP employment can be economically viable, if the majority of GP freed up time (i.e. 80% on average) is reallocated to achieve the 12% practice growth needed to pay off NP employment costs. This study has also shown some indications that smaller general practices economically perform better than larger practices, but more research is needed to confirm these findings. Given the specific character of the estimation of the economic viability, other references were not found. So the findings will be discussed from a social perspective.

The model for estimating economic viability was based on the hypothesis that practice growth is possible. Nevertheless, practice growth is variable and depends on many factors such as practice characteristics, demand of care and the number of general practices situated in the same region. GPs are sceptic towards the growth potential of their general practice. Their scepticism is geared by doubts as to the actual growth of care demands that can be expected in their region. In addition, not all GPs are willing to increase practice size, regardless of increased demand. Health insurers do not perceive practice growth to be such an obstacle. The national estimations (Capacity group 2008) suggest that the overall demand of care in general practice will increase in the next decade with 16–32%. Although the broad range of the estimations leaves room for uncertainty, the required increase of on average 12% to break even on NP employment costs is well beyond the lower limit of this estimation. Moreover, the maximum estimated practice growth achievable by NP employment of 15% (i.e. when 100% of freed up time is reallocated to practice growth) would be insufficient to meet the lowest estimate of increased care demand. Nevertheless, whenever for any reason sufficient growth is not (yet) realised, then stakeholders' willingness to contribute to some form of additional reimbursement becomes relevant. Both GPs and health insurers have different views about each others' responsibility in this matter. GPs would welcome a reimbursement system, allowing them the freedom to choose for themselves which professionals to employ. Ideally, they would like all NPs' activities to be integrated in the reimbursement system. Currently, only substituted patient-related tasks generate income for the general practice. Furthermore, differences found in economic revenue and use of the NP in smaller vs. larger general practices (higher NP production, higher percentage of substituted and lower percentage of complementary NP tasks in smaller practices) prompt a discussion about what the tasks and responsibilities of the NP ideally should be both from a quality and efficiency perspective. From an economic perspective, a narrow focus on only substituted tasks might be preferred, as it generates income. However, we have seen that on average, a large proportion of the NP tasks consist of complementary tasks (23%), which are currently not reimbursed. These tasks are often tasks that GPs feel are of importance, to enhance quality of care in their practice, but which they themselves were unable to take on because of their demanding workload. If primary care wants to be prepared for the growing demand for care, it might just be that sustaining the quality of this care is largely linked to upfront investment in these complementary tasks. On the other hand, the study results provide some indication that in some general practices, more efficiency can be achieved

without a loss of quality by taking a closer look at the current mix of nursing/supportive staff available.

General practitioners have indicated that they would like differences in reimbursements between professionals in general practice resolved. The fact that health insurers offer additional reimbursement for practice nurses but not for NPs might provide a false incentive for GPs in their choice for a new professional. Unless this is resolved, primary care might find itself insufficiently equipped with a suboptimal mix of professionals for dealing with future care demands. Health insurers overestimate the GPs' willingness to contribute to NP reimbursement and are reluctant to adjust the current reimbursement system to allow for additional NP reimbursement.

Conclusion

The economic viability of the NP has proven difficult to achieve in every day health care practice. However, our model estimations indicate that NP employment can be economically viable, if the majority of GP freed up time (i.e. 80% on average) is reallocated to achieve the 12% practice growth needed to pay off NP employment costs. This study provided insight into the complex interaction of the (cost) parameters that result in economic viability and needs a further discussion about the content of the NP role in general practice based on optimal quality of care vs. efficiency as well as a need to look at the optimal mix of professionals in general practice.

Relevance to clinical practice

The challenges that the Dutch primary health care system faces with respect to the introduction of the NP in general practice are not unique. Internationally, innovations with respect to skill mix and care management programmes are often met with enthusiasm, but broad-scale implementation is hampered because a clear implementation policy on a national scale is lacking. Now that more and more scientific evidence about both efficiency and effectiveness of the NP in general practice is becoming available, questions about implementation, task contents and reimbursement of new professionals should be resolved. Effective and efficient health care can only be provided if the actual care needs of a population provide the basis for deciding what mix of professionals is best equipped to deal with the changing and increasing demand of care. Against this background, existing reimbursement structures and skill mix policies have to be evaluated and if necessary reformed. The UK context, for example, is not that different from the Dutch. Their financial incentive structure for GPs (i.e. the Quality and Outcomes

Framework) is geared towards encouraging higher-quality care for patients (Ashworth & Millett 2008). This policy can be an example for the Dutch health care system. Those GPs who have demonstrated to be successful in employing optimal skill mix to achieve an efficient and effective care should be considered for a remuneration (Leatherman *et al.* 2003).

With stakeholders' polarised views on the topic of NP reimbursement, a macro-level intervention from policy makers such as the Department of Health seems into place. The Department of Health should translate its acknowledgement of the importance of the NP role in primary care (Ministry of Health 2008) into action. To secure affordability, accessibility and uniformity in quality of care, the government should urge stakeholders on a national level (National GP Association and Dutch Association of health insurers) to try to come to a uniform policy, including stimuli to organise patient care efficiently and effectively and a long-term vision with respect to skill mix in relation to demand of care. With the increasing complexity of general practice, attention is needed to improve the management of general practice (e.g. training of management skills). If not, local differences with respect to both quality of care and reimbursement of skill mix will increase, and unjustified reimbursement differences between nursing staff in general practice will continue to exist. To facilitate a change process, dissemination of research evidence, as provided by our study and best practices, is necessary.

These results can be influenced by e.g. the variety of settings or differences in scope of practice. Therefore, the descriptive and explorative nature of this study calls for additional research, so that the results found in this study can be validated. Future research with a larger sample size and in different contexts is needed to confirm these results and to identify potential covariates that influence these preliminary findings. Also, the investigation into other influencing factors such as the economic consequences of non-attendance at appointments (DNAs) is needed. Given the complexity of this type of research, as well as the variety of interests of the stakeholders involved, a combination of both quantitative and qualitative studies might be the best way forward.

Finally, we recommend future research and cross-national comparisons – e.g. UK and the Netherlands – where the role of GPs is comparable, to see whether these findings sustain in a larger sample size and over a longer period of time.

Ethics committee

Informed consent was obtained and ethical approval for the study was obtained from the local Medical Ethical Judgment Committee, Eindhoven, the Netherlands.

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Contributions

Study design: AR, HJMV, LMGS, ATMD, ED; data collection and analysis: AR, HJMV, LMGS, ATMD, ED and manuscript preparation: ATMD, LMGS, AR, HJMV, ED.

Conflict of interest

The authors that they have no conflict of interest.

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Appendix

Professionals in Dutch general practices

Virtually all Dutch citizens are registered with a general practitioner (or GP). The GP is a trusted gatekeeper to the Dutch health care system. If the patient has any medical question or problem, he/she goes to the GP first. The general practitioner will examine or provide the patient with a prescription. Alternatively, he can refer to medical specialist when needed. If the patient would like to make an appointment, the GP's assistant, a trained professional, will ask questions to determine the urgency of your situation. Most GPs have walk-in hours in the morning. Patients are seen on a first come, first served basis. Home visits are reserved for urgent cases and people incapable of visiting the GP's office. A consult with a GP is on average limited to 10 minutes and tends to take place during regular office hours. Most GPs are part of a network of practices, which provide care during evening, night or weekend. (<http://www.minvws.nl/en/themes/health-insurance-system/default.asp>).

In the early nineties, following the example in the UK, practice nurses and nurse specialists have been introduced in the Netherlands. New nursing role was seen to be a potential solution to diverse problems and needs in different fields of the tasks of GPs (Tyrell & Dauphinee 1999, Romanow 2002). Currently, nurses perform many tasks ranging from health assessment to education and prescribing. Traditionally, GPs focus on curative care but the introduction of nurses facilitated the shift of primary care to prevention and chronic care management (Atkin *et al.* 1994, Brown & Grimes 1995, Mc Kenna 1995). In general, tasks or functions performed by

nurses on the boundaries with physicians can assume different forms (Starfield 1992):

- supplementary i.e.: tasks or functions that could be done, although inefficiently, by physicians;
- complementary i.e.: tasks or functions for which physicians often have neither the skills nor the time to do well;
- substitute i.e.: tasks or functions that are traditionally performed by physicians.

It has been demonstrated that nurses can undertake much of the health promotion work of general practice and can have a leading role in the routine management of chronic diseases such as asthma, diabetes and coronary heart disease (Vrijhoef *et al.* 2000, Laurant *et al.* 2005). A review of available research has shown that nurses can achieve health outcomes that are as good as those of general practitioners and that they may have superior interpersonal skills (Laurant *et al.* 2005).

Depending on the complexity of tasks, degree of autonomy and level of training, traditional forms of curative care may be provided by nurse practitioners, nurse specialists, specialised nurses, practice nurses and practice assistants (Kernick & Scott 2002).

Health insurance system

The Dutch health care system is built on the principle of solidarity. Health care rules are determined nationally by the Ministry of Health, Welfare and Sport in consultation with patient right groups, health care providers and health insurers. The Health Care Authority supervises the system and the Health Inspection supervises the health care providers.

Under the new Health Insurance Act (implemented in 2006), all residents of the Netherlands are obliged to take out a health insurance. The system is a private health insurance with social conditions. The system is operated by private health insurance companies; the insurers are obliged to accept every resident in their area of activity. A system of risk equalisation enables the acceptance obligation and prevents direct or indirect risk selection. The insured pay a nominal premium to the health insurer. Everyone with the same policy will pay the same insurance premium. The Health Insurance Act also provides for an income-related contribution to be paid by the insured. Employers contribute by making a compulsory payment towards the income-related insurance contribution of their employees.

The health insurance comprises a standard package of essential health care. The package provides essential curative

care tested against the criteria of demonstrable efficacy, cost-effectiveness and the need for collective financing.

The Health Insurance Act defines insurance cover according to types of care. The care insurer may decide which qualified person or institution will provide the insured care. Similarly, the insurer may decide whether to provide the insured care to insured persons in kind or through reimbursement of costs they pay to the care provider they chose. The health care offices have 'duty of care' in that they are required to ensure that their clients can obtain the health care to which they are entitled. To this end, the health care offices they engage enter into contracts with health care providers and institutions. These contracts regulate the volumes of health care services that will be provided, the charges and other such matters. (<http://www.minvws.nl/en/folders/z/health-insurance-in-the-netherlands-2.asp>).

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