

ORIGINAL RESEARCH

A randomized controlled trial of nurses vs. doctors in the resolution of acute disease of low complexity in primary care

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Abstract

Aims. To compare the effectiveness of care delivered by nurses to the usual care delivered by general practitioners, in adult patients requesting same day appointments in primary care practices in Catalonia (Spain).

Background. Same day appointments conducted by nurses are characterized by high patient satisfaction and a high resolution index. The profile of nursing and the organization of primary care services in our country differ from other countries.

Design. Multicentre, randomized, unblinded clinical trial with two parallel groups.

Methods. Patients were randomized to an intervention group (seen by nurses trained to respond to low complexity problems) or a control group (seen by the general practitioner) using an automatic probabilistic function. Setting: 38 primary care practices in Catalonia, 142 general practitioners and 155 nurses participated. Population study: ≥ 18 -year-old patients who requested a same day consultation. Recruitment period: January–May, 2009. Of the 1,461 randomized patients, 92.5% completed the study. Main outcome measures: resolution of symptoms and patient satisfaction 2 weeks after the visit.

Results. Seven hundred and fifty-three patients were assigned to the intervention group and 708 to the control group. Nurses successfully solved 86.3% of the cases. We did not observe any differences in resolution of symptoms or patient satisfaction between the groups.

Conclusions. Nurses trained specifically to resolve acute health problems of low complexity give comparable quality of care to that provided by general practitioners in terms of resolution of the problem 15 days after the visit and in patient satisfaction with the visit.

Keywords: low complexity problems, nurses, patient satisfaction, primary care, resolution, same day consultation

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Introduction

High demand for general practitioner's (GP) appointments is one of the most worrying problems for Spanish health-care professionals. Resulting time constraints compromise GP's problem-solving capacity and result in increased secondary care referral rates (Iliffe 2000, Bellón 2004, Laurant *et al.* 2004, Casajuana 2005, Bonsall & Cheater 2008). The cause of this problem is multifactorial. It is partly related to a social change that has an impact on the health services demand pattern and partly to the multiple recommended activities; according to Bodenheimer (Bodenheimer 2008), a GP would need 18 hours a day to implement, on 2,500 assigned patients, the recommendations of the ten most prevalent chronic diseases' practice guidelines and all the preventive activities recommended. The solution could rely on the development and implementation of alternative, imaginative ways of responding to the demand (Bodenheimer 2008). The current situation shows the urgent need to introduce reforms in the management of the demand for care (Casajuana 2005).

Background

In this context, there have been different organizational approaches aimed at improving the management of medical consultations; for example, eliminating bureaucratic activities from the visit, which in Spain accounts for more than 40% of the consultations (Isanta *et al.* 2000, González

et al. 2004, Pedrera *et al.* 2004)' decreasing the demand induced by the professional or introducing new skills in nursing that were, until recently, outside the scope of nursing (Salvage & Smith 2000, Shum *et al.* 2000, Hollinghurst *et al.* 2006, Keleher *et al.* 2009). Currently, nurses are better trained than they were when the primary care reform began; and even their competences are based on nursing care, they could assume those GP's competences regarding the care of acute self-limited problems that require health education and promoting self-care. Some reviews indicate that between 25–50% of the work performed by GPs could be transferred to the nursing sector. In fact, the line that separates the role of the GP from that of the nurse in primary care is increasingly blurred (Richardson & Maynard 1995, Pedrera *et al.* 2004, Godlee 2008).

The expansion of the spectrum of nursing skills began in the US at the end of the 1960s as a response to a growing shortage of doctors and soon expanded to other countries such as Canada, England, Australia and New Zealand (Bonsall & Cheater 2008). As a result, there are pioneering experiments in these countries evaluating the role of nurses in the out of hours triage and resolution of health problems via telephone (Lattimer *et al.* 1998)' in the development of consultations for secondary prevention of cardiovascular disease (Imperial Cancer Research Fund OXCHECK Study Group 1995, Campbell *et al.* 1998, Delaney *et al.* 2008)' in periodic check-ups of chronic diseases (Lenz *et al.* 2004) and in the resolution of same-day consultations (Kinnersley *et al.* 2000, Shum *et al.* 2000, Venning *et al.* 2000, Bellón 2004). Although the task of following-up chronic diseases has been given to nurses in our country's primary care practices, it is the GP who traditionally sees most of the patients requesting same day appointments (Bellón 2004, Casajuana 2005). This type of demand represents a significant part of the GP's daily activity, despite the fact that it tends to include less complex, self-limited acute pathology which generally requires no specific medical care (Richardson & Maynard 1995, Kinnersley *et al.* 2000, Shum *et al.* 2000, Horrocks *et al.* 2002, Giesen *et al.* 2007). The percentage of patients requesting this type of visit oscillates between 10% and 25% in Spain (Bellón 2004, Collada *et al.* 2004, Pedrera *et al.* 2004). Some articles indicate that the main reasons for same day appointment's requests are bureaucratic in nature or represent problems that could be seen another day. The profile of users demanding these type of visits are young people between the ages of 20–30 who prioritize rapid care, independently of the professional attending them (Kinnersley *et al.* 2000, Shum *et al.* 2000, Rodriguez *et al.* 2001), It is estimated that 75% of the population

uses urgent care services, even when the illness does not require it. These kinds of consultations consume 50% of a GP's time (Díaz-Berenguer *et al.* 2002).

Nurses are able to solve independently up to 85% of the consultations (Marsh & Dawes 1995, Bonsall & Cheater 2008). The latest review in 2009 (Keleher *et al.* 2009) corroborates the results of previous reviews (Laurant *et al.* 2004) which affirm that visits conducted by nurses are characterized by high patient satisfaction and a high resolution index. Generally, nurses consultations take longer than GPs, however, they give patients more information and they achieve higher patient adherence to treatments. About the resolution of health problems, morbidity, mortality, health status perception and drug prescriptions, the results are equal between professionals. Studies also reveal that GPs and nurses request a very similar amount of diagnostic and complementary tests and follow-up visits.

There are few studies that have evaluated this matter in Spain (Isanta *et al.* 2000, Collada *et al.* 2004, González *et al.* 2004, Pedrera *et al.* 2004, Brugués *et al.* 2008); furthermore, the profile of nursing and the organization of primary care services in our country differ from other countries. The most important differences are the restrictive legislations in prescription, the introducing a new role of nurses in practice and population resistance to be attended by nurses (Fabrellas *et al.* 2011). Even though service providers are currently undertaking steps to expand the role of nurses in the resolution of health problems, especially during periods of increased demand such as the influenza epidemic, it is necessary to conduct studies evaluating this kind of intervention in our country.

The study

Aims

The aim of the study was to compare the effectiveness of care delivered by nurses to the usual care delivered by GPs, in adult patients asking to be seen on the same day in primary care practices belonging to the Institut Català de la Salut (ICS) in Catalonia (Spain).

Methodology

Design

A randomized, unblinded clinical trial with two parallel groups. Patients were randomized to an intervention group (seen by nurses trained to respond to low complexity, acute pathologies), or a control group (seen by the GP).

Participants

Eligible participants were patients who went to any of the participating centres and asked to be seen on the same day. The inclusion criteria were: (i) to be 18 years old or more; (ii) to have an assigned GP or nurse in the centre; and (iii) to present with one of the problems included in the study (burns, injuries, acute diarrhoea, non-specific low back pain, acute mild upper respiratory symptoms (including odynophagia) and urinary discomfort). Patients with the following characteristics were excluded: (i) needle drug users; (ii) presence of a serious health condition; (iii) receiving oral anticoagulant treatment, lithium or monoamine oxidase inhibitors; (iv) history of serious disease; (v) pregnant or breast feeding; (vi) hospitalization in the previous 15 days; (vii) foreseeable difficulties in completing the intervention or follow-up; (viii) home visit; (ix) telephone visit; (x) previously included in the study; and (xi) previously seen for the same episode.

Study settings

In the study 142 primary care practices belonging to the Institut Català de la Salut (ICS) were invited to participate. The ICS is the main primary care service provider in Catalonia (Spain), giving coverage to approximately 80% of the total population (7,475,420 inhabitants in 2009). To participate in the study, each practice had to include at least one GP, one nurse and one administrative staff member.

Interventions

All patients requesting a same day appointment were referred to a healthcare professional who checked the inclusion and exclusion criteria, explained the nature of the study and asked for consent to participate in the study. Once oral and written consent were obtained, the patient was randomly assigned to either the control or intervention groups.

Patients assigned to the intervention group were seen by trained nurses who followed the guideline developed during the study's preparation phase. The nurses had access to an electronic application which included the guideline, designed as a decision-making support tool. Patients assigned to the control group were seen by the GP, who followed the usual procedures established in the practice and did not have access to any kind of decision-making support tools.

Sample size

The sample size was calculated to determine bioequivalence between two proportions. A sample of 1,064 patients was obtained based on the following assumptions: a 65% resolution of symptoms at the two-weeks follow-up, relevant differences as $\geq 10\%$, a bilateral contrast of hypothe-

sis, an α value of 0.05, a β value of 0.10 and 10% loss to follow-up. To isolate the effect of the intervention and to eliminate differences due to variability between professionals, a minimum of 40 professionals (20 nurses and 20 GPs) and 20 primary care practices were required to participate. Due to the presence of intraclass correlation in patients seen by the same professional, the sample size was adjusted by an inflation factor of 2.024, obtaining a final sample size of 2,154 patients (1,077 per group).

Since participation was higher than expected, the intraclass correlation inflation factor was recalculated as 1.121, taking into account the actual number of participating professionals (142 GPs and 155 nurses). The percentage of loss to follow-up was increased to 20%, as this figure was considered to be more suited to the reality of the clinical trial. The rest of the applied assumptions in the initial calculation were maintained, obtaining a final sample size of 1,340 patients (670 per group).

Randomization – sequence generation

Participants were randomly assigned following simple randomization procedures to intervention or control using an automatic probabilistic function which assigns one group or another using a probability of 0.5. Patients were recruited consecutively until the necessary number of subjects was obtained, ensuring a balanced allocation of groups.

Randomization – allocation concealment:

The application was used to implement the random allocation sequence. The sequence was concealed until groups were assigned because the application generated the sequence just after the patient gave oral and written consent to participate in the study.

Randomization – implementation

Once the application assigned the group, the healthcare professional said the group assigned to the patient.

Blinding (masking)

Participants, nurses and GPs were not blinded to group assignment. The administrative staff member, who phoned the patients 15 days later to the first visit, were blinded to group assignment.

Data collection

The consultation and follow-up variables were collected in an application specifically designed for the study. The main variables were collected using a telephone interview 15 days after the visit.

Outcomes

To measure the effectiveness of the intervention, the following primary outcome measures were collected: resolution of symptoms (yes/no) and patient satisfaction (scale from 0–10) 2 weeks after the visit (Catalan Ministry of Health & Catalan Health Service 2012).

The secondary outcome measures were: Resolution by nurse (1 = resolution without the intervention of the GP, 2 = resolution after consulting with the GP, 3 = resolution after referring to the GP by protocol indication, 4 = non-resolution and referral to the GP. Categories 1–3 were considered satisfactory resolution by the nurse and category 4 was considered non-resolution); re-visit in primary care for the same reason during the following 2 weeks (yes/no); admission to hospital for the same reason during the following 2 weeks (yes/no); duration of the visit; patient perception of the quality of the information and care received; use of resources on drug prescriptions and sick leave; the patient's preferences on which professional they would like to visit in case of a similar health problem. The co-variables were: Professional seen; primary care practice; reason for consultation; age; gender; previous polymedication (more than five drugs taken regularly).

Validity and reliability

The primary outcome, the patient satisfaction, consisted of a validated and reliable measurement tool (Catalan Ministry of Health & Catalan Health Service 2012). It was a pragmatic clinical trial conducted in clinical practice with real clinical situations. The study population was very similar to the adult population requesting same day appointments in primary care. All of this and the high number of GPs and nurses who participated in the study, ensure that the study had high external validity. The review and monitoring of the study protocol, the quality management of information, the coordination of field work and adverse effects related to the clinical trial were monitored by a clinical trial monitor.

Ethical considerations

Research Ethics Committee approval was obtained.

Data analysis

To evaluate the effectiveness of the intervention, an intention-to-treat analysis with a statistical significance level of 5% was performed. All of the randomized patients were included in the analysis.

Multilevel regression models with three levels were performed according to the following hierarchical structure: patients (level 1); nested in the professional (level 2); nested in the primary care practice (level 3). The multilevel regression models were performed using the GLLAMM function (Generalized Linear Latent and Mixed Models) in Stata 10.1 (StataCorp, College Station, Texas 77845 USA). Linear multilevel regression models were created for continuous response variables and multilevel logistic regression models were created for binary response variables. All models assumed that a random effect existed at both professional and practice levels. The fixed effects were estimated using odds ratios (95% CI) in the multilevel logistic regression and as mean differences (95% CI) in the multilevel linear regression. Two different multilevel models were estimated for each of the response variables. The first model included the variable "group" (intervention vs. control, unadjusted) and the second model, in addition to the variable "group", also included the following variables: reason for consultation, gender, age, health status and polymedication (adjusted model).

Results

Participant flow

Of the 2,383 patients who requested a same day appointment, 1,461 (61.3%) were assigned to either the intervention or control group. Eight hundred and eight patients were excluded because they either did not meet the inclusion criteria or presented exclusion criteria and 114 were excluded because they did not sign the informed consent form. Of the 1,461 randomized patients, 1,351 (92.5%) completed the study (Figure 1).

Recruitment

The recruitment period was 1 January 2009 – 31 May 2009. Fifteen days after the first visit, the previously trained administrative staff member phoned the patients to conduct a questionnaire that collected the main and secondary variables. The patient follow-up was ended after this phone call.

Baseline data

The study was conducted in 38 practices, involving a total of 297 professionals (142 GPs and 155 nurses). The mean number of professionals per practice was seven (range 2–22). Stratified by professional, this number was four GP per practice (range 1–12) and 3.5 nurses per practice (range 1–11). Each practice attended a mean of 52 patients (range

4–59) and each professional visited a mean of three patients (range 1–48).

In the control group there were 708 patients, the mean age was 38.6 (SD 14.5) and 61.2% (433/708) were women. In the intervention group there were 753 patients, the mean age was 39.0 (SD 15.1) and 61.0% (459/753) were women. In both groups, more than 50% of the visits were due to acute mild respiratory problems, followed by acute diarrhoea, low back pain and injuries (Table 1).

Level of resolution by nurses

Nurses successfully solved 86.3% (95% CI: 83.6–88.7) of the cases (Figure 2). The health problem that nurses solved with greatest ease was burns (100%; 95%CI: 81.90–100), followed by injuries (94.29%; 95%CI: 86.79–98.16) and acute diarrhoea (90.70%; 95%CI: 84.72–94.86). On the contrary, 17.5% (95%CI: 10.32–27.00) of low back pain, 16.09% (95%CI: 12.75–19.92) of visits for acute mild upper respiratory symptoms and 15.56% (95%CI: 7.07–28.36) of visits due to urinary discomfort were referred to the GP.

Use of resources

The mean visit duration by GPs was 3 minutes, as opposed to 6 minutes for visits by nurses (mean difference of 3.195; 95%CI: 1.466–4.924). Nurses prescribed drugs in 65.1% of cases vs. 84.8% prescribed by GPs (OR:0.24; 95%CI: 0.16–0.35). Sick leave was prescribed in 15.7% of cases by nurses, as opposed to 18.7% by GPs. These differences were not statistically significant (OR: 0.79 95%CI: 0.57–1.10; Table 2).

Level of resolution of symptoms and satisfaction at the two-week follow-up

The ability to solve the health problem presented (OR: 1.10; 95%CI: 0.84–1.46) and the improvement in health status compared with the day of the visit (OR: 0.81; 95% CI: 0.53–1.24) were similar in both groups (Table 3). The percentage of patients that revisited for the same problem in any primary care practice was also similar in both groups (OR: 1.04; 95%CI: 0.77–1.41; Table 3).

When patients were asked about their preferences on which professional they would like to visit in case of a similar health problem, more than 40% of patients in each group expressed indifference. In the control group, 13.9% of patients would prefer to be seen by a nurse, as opposed to 20.9% in the intervention group (Table 4). The overall

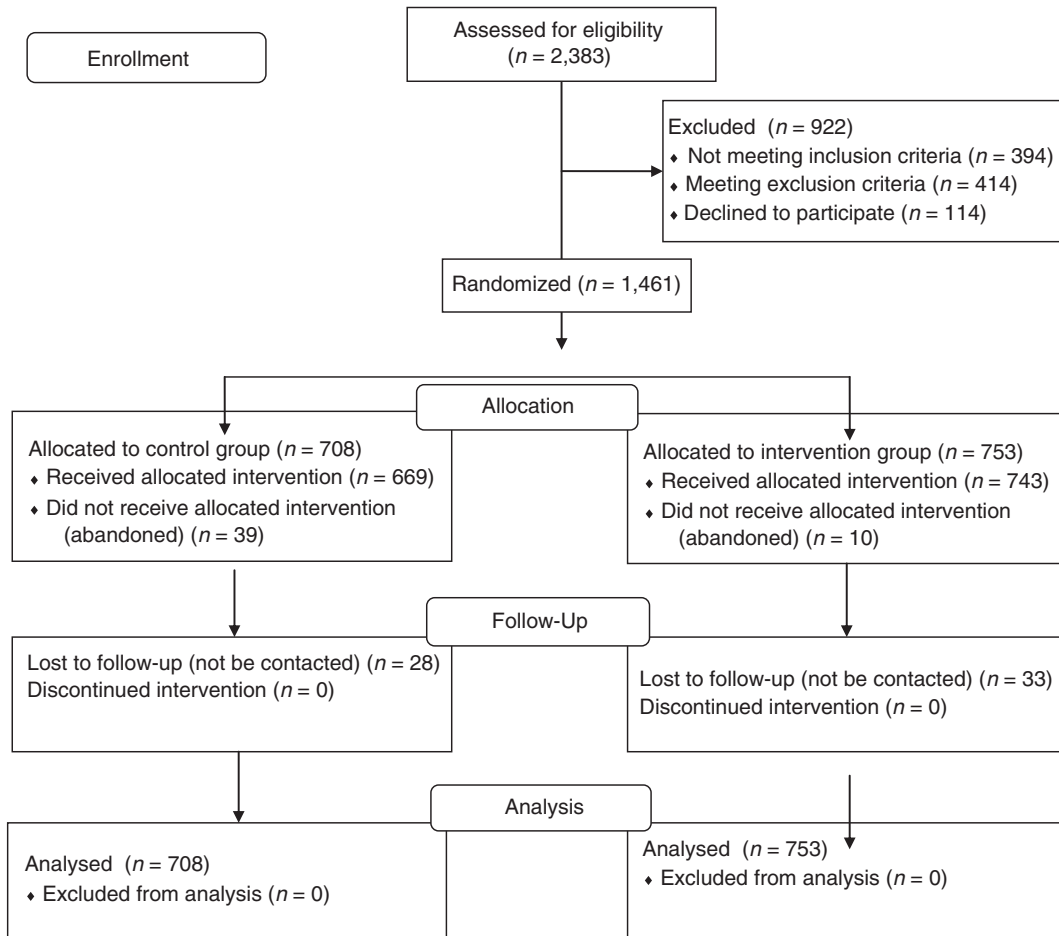


Figure 1 Patient recruitment flow chart.

satisfaction with the visit was 8.3 points in patients attended by a GP and 8.5 points in those attended by a nurse; however, these differences were not statistically significant (mean difference = 0.140; 95%CI: -0.126-0.407). When evaluating the degree of patient satisfaction with certain components of the visit, it was observed that, in general, patients attended by a nurse were more satisfied; however, these differences were either statistically insignificant or barely reached the limit of significance (Table 5).

Adverse events

There were no adverse events in any of the groups.

Discussion

The results of the study suggest that the quality of the care provided by nurses specifically trained to solve acute health problems of low complexity is comparable to that provided by GPs in terms of resolution of the problem 15 days after

the visit, patient satisfaction with the visit and use of resources. The solving skills observed in nursing were higher than expected in the study hypothesis. The initial expectation was probably limited as nurse training in our area is, *a priori*, different to that in other countries with published studies. However, most of the health problems seen by nurses were resolved without the need of a GP referral. In 72.14% of the patients attended by nurses, the health problem was resolved following the corresponding protocol and without consulting the GP. These figures are similar to those observed in other studies, which oscillate between 73.0%-86.5% (Marsh & Dawes 1995, Shum *et al.* 2000). Our results are also similar to shown by a healthcare centre in our area, which observed a 63.9% resolution by the nurse (Brugués *et al.* 2008).

Being seen by nurses did not appear to be a problem for patients. Patients expressed a similar degree of satisfaction independently of which professional they saw and they believed that nurses had correctly resolved their problem, as has been seen in other studies (Laurant *et al.* 2004). This

Table 1 Baseline characteristics of patients and reasons for visit.

	Visited by physician (control group; N = 708)	Visited by nurse (intervention group; N = 753)
Age (years)	38.6 (14.5)	39.0 (15.1)
Gender (female)	433 (61.2%)	459 (61.0%)
Perceived health		
Excellent	60 (8.5%)	67 (8.9%)
Very good	195 (27.5%)	208 (27.6%)
Good	336 (47.5%)	385 (51.1%)
Regular	106 (15.0%)	83 (11.0%)
Bad	11 (1.6%)	10 (1.3%)
Poly-medicated patients (≥ 5 drugs; ≥ 6 months)	21 (3.0%)	20 (2.7%)
Reasons for visit		
Minor skin burns	13 (1.8%)	15 (2.0%)
Urinary discomfort	30 (4.2%)	45 (6.0%)
Injury	75 (10.6%)	71 (9.4%)
Low back pain	79 (11.2%)	80 (10.6%)
Acute diarrhoea	113 (16.0%)	131 (17.4%)
Acute mild upper respiratory symptoms	398 (56.2%)	411 (54.6%)

*Data are means (SD) or numbers (%).

is confirmed by the fact that less than 15% of patients in both groups revisited for the same reason. Patients were slightly more satisfied with some aspects of the visit when visiting with nurses; however, this did not necessarily mean that the patients prefer nurses over GPs. Some patients preferred to visit a nurse, while others preferred to visit a GP. This could be related to patients' habit of visiting the GP, and to the perceived severity of the problem; it is probable that patients prefer the GP when they consider the problem to be serious and nurses when they consider it to be mild. Even so, in the intervention group (the group seen by

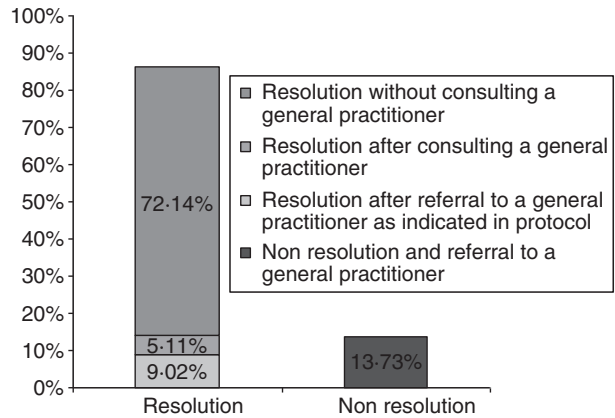


Figure 2 Level of resolution by nurses.

nurses) there were more patients who would return to a nurse than in the control group (the group seen by GPs).

Regarding the use of resources, nurses prescribed fewer drugs than GPs (65.1% vs. 84.8%). In previously published studies, statistically significant differences were not observed in drug prescription between GPs and nurses (Laurant *et al.* 2004). In our study, nurses could only prescribe drugs that the decision-making support tool allowed according to the signs or symptoms that the patient presented. GPs did not use any specific protocol that suggested which prescription to use nor that gave them any help. This factor should be considered when reproducing the intervention, as part of the results could be due to the tool. On the other hand, when the complexity of cases and health problems were similar, the percentage of drugs prescribed by the physicians in our study (84.8%) was much higher than the percentage prescribed in other studies (61–63%) (Shum *et al.* 2000,

Table 2 Use of resources during visit in control group and intervention group.

	Visited by physician (control group; N = 708)*	Visited by nurse (intervention group; N = 753)*	Multilevel analysis (N = 1,461)**	
			Unadjusted OR/MD (95%CI)	Adjusted OR/MD *** (95%CI)
Patients analysed	669	743	1,461	1,461
Duration of the visit (minutes)	3 (1–6)	6 (3–10)	3.208 (1.463–4.953)	3.195 (1.466–4.924)****
Patients with prescribed drugs	567 (84.8%)	484 (65.1%)	0.28 (0.20–0.28)	0.24 ***** (0.16–0.35)
Patients with sick leave	125 (18.7%)	117 (15.7%)	0.79 (0.58–1.07)	0.79 ***** (0.57–1.10)

*Data are medians (interquartile range) or numbers (%).

**Multilevel analysis by intention to treat, including the variability due to the professional that sees the patient and the variability due to the primary care practice that the professional belongs to.

***OR (Nurses/General practitioners): odds ratio. MD (Nurses- Physicians): mean differences. Adjusted for the following variables: reason for visit, gender, age, general state of health and poly-medication.

****Mean differences (95% CI), multilevel lineal regression model.

*****Odds ratios (95% CI), multilevel logistic regression model.

Table 3 Visit resolution.

	Visited by physician (control group; N = 708)*	Visited by nurse (intervention group; N = 753)*	Multilevel analysis (N = 1,461)**	
			Unadjusted OR (95%CI)	Unadjusted OR (95%CI)***
Patients analysed	641	710	1,461	1,461
Patients that report that their health problem has been solved	543 (84.7%)	616 (86.8%)	1.13 (0.84–1.50)	1.10 (0.84–1.46)
Patients' assessment on the state of the health problem after 15 days				
Improved	586 (91.4%)	661 (93.1%)	1	1
The same or worse	54 (8.4%)	48 (6.8%)	0.79 (0.52–1.21)	0.81 (0.53–1.24)
Patients that report having returned to primary care for the same reason	79 (12.3%)	90 (12.7%)	1.03 (0.76–1.34)	1.04 (0.77–1.41)
Patients that report having gone to a hospital emergency room	13 (2.0%)	14 (2.0%)	****	****

*Data are numbers (%).

**OR (Nurses/Physicians). Multilevel analysis by intention to treat, including the variability due to the professional that sees the patient and the variability due to the primary care practice that the professional belongs to.

***All of the models were multilevel logistic regressions which were adjusted for the following variables: reason for visit, gender, age, general state of health and poly-medication.

****The available data did not permit this calculation.

Table 4 Future intention about seeing a professional.

	Visited by physician (control group)		Visited by nurse (intervention group)	
	N	%	N	%
Future preference				
Physician	271	42.3%	220	31.0%
Nurse	89	13.9%	148	20.9%
Would not return	11	1.7%	11	1.5%
Indifferent	270	42.1%	331	46.6%
Total	641	100.0%	710	100.0%

Table 5 Grade of patient satisfaction with respect to the visit after 15 days.

	Visited by physician (control group; N = 708)*	Visited by nurse (intervention group; N = 753)*	Multilevel analysis (N = 1,461)**	
			Unadjusted mean difference (95CI%)	Adjusted mean difference (95CI%)***
Patients analysed	641	710	1,461	1,461
Overall satisfaction with the visit (0–10)	8.3 (1.7)	8.5 (1.7)	0.148 (–0.123–0.419)	0.140 (–0.126–0.407)
Satisfaction with duration of the visit (0–10)	8.1 (1.7)	8.4 (1.6)	0.266 (0.025–0.506)	0.256 (0.016–0.496)
Satisfaction with personal attention (0–10)	8.6 (1.6)	8.8 (1.4)	0.241 (0.004–0.478)	0.240 (0.003–0.476)
Satisfaction with explanations and information received in the visit (0–10)	8.3 (1.7)	8.5 (1.6)	0.247 (0.014–0.500)	0.240 (0.015–0.495)

*Data are means (sd).

**Mean difference(Nurses-Physicians). Multilevel analysis by intention to treat, including the variability due to the professional that sees the patient and the variability due to the primary care practice that the professional belongs to.

***All of the models were multilevel linear regressions which were adjusted for the following variables: reason for visit, gender, age, general state of health and poly-medication.

What is already known about this topic

- Visits conducted by nurses are characterized by high patient satisfaction and a high resolution index.
- The resolution of health problems, morbidity, mortality, health status perception and drug prescriptions are very similar between professionals.
- There are few studies that have evaluated this matter in Spain.

What this paper adds

- Spanish nurses trained specifically in the resolution of acute health problems of low complexity give quality care comparable to that provided by general practitioners.
- Nurses prescribed fewer drugs than general practitioners.
- Low back pain, acute mild upper respiratory symptoms and urinary discomfort presented inferior levels of resolution.

Implications for practice and/or policy

- The fact that nurses resolve certain reasons for consultation with the same security as general practitioners, could allow better and more efficient management of the demand for care.
- Sharing visits between general practitioners and nurses will allow increasing professional competencies in nursing.
- This study could help to reduce resistance to change in both family physicians and nurses, as well as in the general population, generating confidence.

Venning *et al.* 2000, Kinnersley *et al.* 2000). The longer duration of visits by nurses than physicians should be interpreted carefully. It is possible that the obtained durations present a problem of validity because they were automatically calculated by the electronic application from the moment that the professional entered the visit screen until exiting it. Visits with short durations could indicate that the professional first conducted the visit and later completed the fields in the electronic application. Furthermore, nurses were required to fill out more fields in the application, which could also contribute to increase the visit duration. Therefore, the longer duration of visits by nurses could be biased by the above mentioned confounding factors and may not be due to longer visits by nurses as has been previously observed (Laurant *et al.*

2004). In this way, the results appear to be consistent, as patients attended by nurses appear to be more satisfied with the time dedicated in the visit than patients attended by GPs. Although these results are statistically significant, they may not be clinically relevant.

The percentage of patients who did not complete the follow-up was low and equally distributed in both groups. Furthermore, there was high variability in the number of participating professionals and patients attended in each practice. All of these aspects have been taken into account in the sample size calculation, and in the multivariate analysis. To reduce possible biases, the analysis was done with intention to treat; variability between professionals and practices was included through a multilevel analysis. The resolution of problems is high in both groups and this is probably because the included health problems tend to be banal and self-limiting in nature and, in many cases, resolve spontaneously. We should ask ourselves whether it is acceptable for these kinds of problems to occupy a place in the agendas of GPs and nurses, or whether patients should be encouraged to allow some time for these problems to settle before consulting a doctor/nurse. This is in contrast to the perception of patients, as < 2% of them would forego the healthcare system if they found themselves in a similar situation.

The selection of the range of health problems that nurses are trained to treat is one of the most complicated aspects. It seems reasonable to start with the most frequent problems that can be resolved by nurses. In our study, the selected and protocolized reasons for consultation were based on data from more than 23 million visits in 2006 in all of the primary care practices of the ICS. The selected reasons were consistent with the ones described in the bibliography; therefore, upper respiratory diseases, low back pain and diarrhoea are the most frequent reasons for same day appointments in primary care. Developing appropriate protocols for these problems, and their gradual introduction, could help to foster patient trust and the support of GPs and nurses who are reluctant to change.

The fact that nurses resolve certain reasons for consultation with the same security as GPs, could allow better and more efficient management of the demand for care. Anyway, it would be necessary to perform an economic evaluation to prove it because the longer duration of nursing visits observed in our study could go against it. Sharing visits between GPs and nurses will allow increasing professional competencies in nursing; it also makes it possible for GPs to increase solving skills in problems that are currently being

referred. Nowadays, there are many health organizations that have incorporated the resolution of low complexity pathologies into nursing. This study could help to reduce resistance to change in both physicians and nurses, and in the general population, generating confidence. We believe that it is positive to generate a culture of evaluation before incorporating new organizational changes.

Limitations

Although the study was designed to be pragmatic and close to daily practice, the profile of professionals and patients included could differ from the profile usually found, as tends to be the case in clinical trials. For this reason, when applying a similar intervention in a real environment, factors such as nurse training, the availability of decision-making support tools and the selection of patient profiles that can be solved by nurses should be taken into consideration. It should be noted that there was variability in the resolution of health problems between participating healthcare centres and between reasons for consultation included in the study. Low back pain, acute mild upper respiratory symptoms and urinary discomfort presented inferior levels of resolution. This lower resolution could be explained by the fact that these problems require more complex physical examinations that are not usual in a nurse's daily work.

Conclusion

Spanish nurses trained specifically in the resolution of acute health problems of low complexity give quality care comparable to that provided by GP in terms of resolution of the problem 15 days after the visit and in patient satisfaction. Nurses prescribed fewer drugs than GPs probably because nurses could only prescribe drugs that the decision-making support tool allowed according to the signs or symptoms that the patient presented. There was variability in the resolution of health problems between participating health centres and between reasons for visits included in the study. Low back pain, acute mild upper respiratory symptoms and urinary discomfort presented inferior levels of resolution.

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Trial registration

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Conflict of interest

No conflict of interest has been declared by the authors.

Author contributions

All authors have agreed on the final version and meet at least one of the following criteria (recommended by the IC-MJE*):

- substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

*http://www.icmje.org/ethical_1author.html.

References

- Bellón J. (2004) Algunas claves en la gestión de la demanda en Atención Primaria. *Semergen* 30, 7–24.
- Bodenheimer T. (2008) Transforming Practice. *New England Journal of Medicine* 359, 2086–2089.
- Bonsall K. & Cheater F.M. (2008) What is the impact of advanced primary care nursing roles on patients, nurses and their colleagues? A literature review. *International Journal of Nursing Studies* 45, 1090–1102.
- Brugués A., Peris A., Martí L. & Flores G. (2008) Abordaje de la demanda de visitas espontáneas de un equipo de atención primaria mediante una guía de intervenciones de enfermería. *Atención Primaria* 40, 387–391.
- Campbell N.C., Thain J., Deans H.G., RitICSe L.D., Rawles J.M. & Squair J.L. (1998) Secondary prevention clinics for coronary heart disease: randomised trial of effect on health. *British Medical Journal* 316, 1434–1437.
- Casajuana J. (2005) En busca de la eficiencia: dejar de hacer para poder hacer. *Formación Médica Continuada* 12, 579–581.
- Catalan Ministry of Health & Catalan Health Service (2012) *The voice of the citizens. How the perception of the citizens is linked to the improvement in health services and the Catalan Health System*. Retrieved September 10, 2012, from the Catalan Health Service website: http://www10.gencat.cat/catsalut/archivos/publicacions/the_voice_of_the_citizens_plaensa.pdf

- Collada J.L., López L.C., Martínez E. & Hidalgo M.P. (2004) Demanda de atención urgente atendida por un equipo de Atención Primaria durante el año 2001. *Atención Primaria* **34**, 55–56.
- Delaney E.K., MuriCSe P., Lee A.J., RitCSe L.D. & Campbell N.C. (2008) Secondary prevention clinics for coronary heart disease: a 10-year follow-up of a randomised controlled trial in primary care. *Heart* **94**, 1419–1423.
- Díaz-Berenguer J.A., Cabeza A., López-Cabañas A., Espiñeira-Francés A.J., Cervera-Valverde C. & Cabrera-Padrón C.D. (2002) El software de gestión integral de la atención primaria, una herramienta de análisis de los indicadores de utilización. *Atención Primaria* **29**, 287–293.
- Fabrellas N., Vidal A., Amat G., Lejardi Y., del Puig Deulofeu M. & Buendia C. (2011) Nurse Management of 'same day' consultation for patients with minor illnesses: results of an extended programme in primary care in Catalonia. *Journal of Advanced Nursing* **67**(8), 1811–1816.
- Giesen P., Ferwerda R., Tijssen R., Mokkink H., Drijver R., van den Bosch W. & Grol R. (2007) Safety of telephone triage in general practitioner cooperatives: do triage nurses correctly estimate urgency? *Quality & Safety in Health Care* **16**, 181–184.
- Godlee F. (2008) What skills do doctors and nurses need? *British Medical Journal* **337**, a1722.
- González J.I., Agudo S. & Esteban C. (2004) Consulta de enfermería a demanda en los centros de salud del INSALUD de la Comunidad de Madrid. *Enfermería Clínica* **14**, 25–30.
- Hollinghurst S., Horrocks S., Anderson E. & Salisbury C. (2006) Comparing the cost of nurse practitioners and GPs in primary care: modelling economic data from randomised trials. *British Journal of General Practice* **56**, 530–535.
- 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.
- Iliffe S. (2000) Nursing and the future of primary care. *British Medical Journal* **320**, 1020–1021.
- Imperial Cancer Research Fund OXCHECK Study Group (1995) Effectiveness of health checks conducted by nurses in primary care: final results of the OXCHECK study. *British Medical Journal* **310**, 1099–1104.
- Isanta C., Rivera P., Pedraga M. & Giménez N. (2000) Características de las personas que acuden a las consultas de demanda del centro de salud sin citación previa. *Revista Española de Salud Pública* **74**, 263–274.
- Keleher H., Parker R., Abdulwadud O. & Francis K. (2009) Systematic review of the effectiveness of primary care nursing. *International Journal of Nursing Practice* **15**, 16–24.
- Kinnersley P., Anderson E., Parry K., Clement J., Archard L., Turton P., Stainthorpe A., Fraser A., Butler 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.
- Lattimer V., George S., Thompson F., Thomas E., Mullee M., Turnbull J., Smith H., Moore M., Bond H. & Glasper A. (1998) Safety and effectiveness of nurse telephone consultation in out of hours primary care: randomised controlled trial. The South Wiltshire Out of Hours Project (SWOOP) Group. *British Medical Journal* **317**, 1054–1059.
- Laurant M., Reeves D., Hermens R., Braspenning J., Grol R. & Sibbald B. (2004) Substitution of doctors by nurses in primary care. *Cochrane Database of Systematic Reviews* **2004**(4), CD001271. doi: 10.1002/14651858.CD001271.pub2.
- Lenz E.R., Mundinger 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.
- Marsh G.N. & Dawes M.L. (1995) Establishing a minor illness nurse in a busy general practice. *British Medical Journal* **310**, 778–780.
- Pedraza V., Orozco D., Gil V., Prieto I., Moya M.I. & Sanchis C. (2004) Characteristics of the demand for medical attention in primary care of a health area in the Community of Valencia (SyN-PC study). *Atención Primaria* **33**, 31–37.
- Richardson G. & Maynard A. (1995) Fewer doctors? More nurses? A review of the knowledge base of doctor nurse substitution. Discussion paper 135. Centre for Health Economics, York Economic Consortium, NHS Centre for Reviews and Dissemination, York.
- Rodríguez R., Briso-Montiano R., López M., García J., Blázquez A. & Mateos R. (2001) Análisis epidemiológico de las consultas de urgencia en Atención Primaria. *Semergen* **27**, 561–565.
- Salvage J. & Smith R. (2000) Doctors and nurses: doing it differently. *British Medical Journal* **320**, 019–020.
- 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.
- 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.

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