



Review Article

Integration of Nurses in General Medicine Practices and General Practitioners' Satisfaction: Systematic Scoping Review

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Abstract

Objectives: Integration of nurses into primary care (PC) has shown favorable effects on patient outcomes; however, the extent and diversity of available literature on general practitioner (GP) satisfaction are unknown. We aimed to gather, map and summarize all available peer-reviewed evidence about GPs' satisfaction. **Methods:** We searched for all observational and intervention studies about integration of nurses into practices in Medline, Embase, PsychINFO, Cochrane Central, ProQuest, CINAHL, Web of Science, with quantitative, qualitative, or mixed methods (outcome GP job satisfaction). **Results:** Two independent reviewers selected 31 studies out of 2562, including 8600 GPs (sample size 3 - 2013). The main outcome was GP satisfaction in 21 studies, GP satisfaction and workload (N=7), GP satisfaction and retention (N=1), and GP satisfaction, burnout and retention (N=2). There were 11 qualitative studies, 10 quantitative descriptive studies, 7 mixed methods studies, 2 randomized controlled trials, and 1 quantitative non-randomized trial. Outcome results were globally positive in 18 studies (58%), mixed in 10 (32%), unchanged in 2 (6%), and unfavorable in 1 (3%). In some studies, GPs expressed concerns about cost-effectiveness, reimbursement of shared care, medico-legal implications (ultimate responsibility with the GP), restrictive payment policies, loss of GP autonomy. Factors of GP satisfaction included gain of time; improved work/life balance for themselves; and gain of services offered to patients, especially in preventive and chronic care. Overall, the results suggest that there should be a clear understanding and agreement on the role of the practice nurse by all stakeholders. **Conclusion:** This review identified quite an important number of studies, with different designs, showing despite some reluctance, GPs' satisfaction in integrating nurses within their practice.

Keywords: Systematic scoping review; Primary care practices; GP satisfaction; Nurses

Abbreviation: APN: advanced practice nurse; BHP: Behavioral health provider; ER: emergency room; FFS: fee-for-service; FP: family physicians; FTE: full-time equivalents; GC: Guided care; HC: Health care; GPs: general practitioners; LPN: Licensed practical nurse; MA: medical assistant; MD: medical doctor; MH: mental health; MMAT: Mixed Methods Appraisal Tool; MP: medical practitioner; NB: number; NCC: nurse care coordinator; NHS: National Health System; NP: nurse practitioners; NR: not

reported; PAs: physician assistants; PACT: Patient Aligned Care Teams; PC: primary care; PCMH: patient-centered medical home; PCMI: Provider Co-Management Index; PCP: primary care provider; PHC: primary health care; PHCT: primary health care team; PHN: public health nurse; PN: practice nurse; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-analyses; RCT: randomized controlled trial; RIC: Resource In Clinics; RN: registered nurse; RNCC: registered nurse care coordinator; VA: Veteran Affairs or Veterans health administration; W: women.

Introduction

Many high-income countries consider strengthening primary care (PC) with new organizational models in order to address demographic, health and cost constraints [1]. PC systems have fostered interprofessional collaboration, with team-based care integrating other healthcare professionals than general practitioners (GPs) within the practices, [2-5], as well as new professions, in particular nurses (nurse practitioner (NP); advanced practice nurse (APN), and new roles (case manager, coach, ...) [6]. In this context, PC nurses mainly provide care for patients with mild acute or chronic diseases but can also develop activities pertaining to health promotion and education [7].

For several decades, many studies have described job dissatisfaction and stress among general practitioners/family physicians, [8-10] causing deleterious effects on their mental health, [11-16] a crisis in their recruitment and retention, [17] and repercussions on the quality of patient care [18-20]. Policies strengthening PC, combined with greater regulation, and potential shortages in many countries, may put GPs under pressure [8-10,15]. Implementing new models of care requires intensive work, including changing practice workflows, staffing substantially, shifting from a physician-centric to a team-based culture, and creating new clinical and administrative tasks. Additionally, obstacles to the integration of a nurse into the GP practice include (for the GP) the fear of losing the patient-doctor relationship, acceptance of task delegation or shifting (a critical issue in terms of autonomy), [7,21], and a lack of clarity about medico-legal implications. In contrast, inter professional collaboration could help alleviate GPs 'heavy workload and frequent interruptions [18,22,23].

If the consequences of the integration of nurses in PC settings care have been extensively studied [4,7,24,25] on patient clinical

outcomes and satisfaction, and health care processes, it is not the case on GPs 'satisfaction and stress [9]. Provider satisfaction is generally regarded as a secondary outcome in intervention studies. While literature suggests that nurses' satisfaction is consistent, the extent and diversity of available literature on General Practitioner (GP) satisfaction are unknown. The general objective was to gather, map and summarize all available peer-reviewed evidence about GPs' satisfaction after the integration of nurses within their practices.

Materials and Methods

We conducted a systematic scoping review [26], and presented the methods, results, and discussion in accordance with the PRISMA extension for scoping reviews [27].

Eligibility Criteria

We selected observational studies (eg, cross-sectional, cohort studies or longitudinal studies), as well as intervention studies (including randomized controlled trials) pertaining to our field of research, published in English, German or French until 2024.

To be included, studies had to have the following features: general medicine practice setting (group or solo) and new integration (or new role) of one or several nurses whatever the kind of nurse (with or without any complementary training, Table 1) and with different activities focusing on wide groups of patients, with task delegation or task transfer.

Qualitative, quantitative, or mixed methods studies (integrating results of qualitative and quantitative studies) were included. Systematic and narrative reviews were excluded. Studies about collaboration between GPs and nurses outside of the practices were excluded.

Kind of nurse	Definition
Registered nurse (RN) & Practice nurse (PN)	Nurse with a bachelor in nursing sciences. (State degree according to US law) Primary health care nurses work in a range of settings, each sharing the characteristic that they are a part of the first level of contact with the health system.
Advanced practice nurse (APN) & Nurse practitioner (NP)	Nurse with a Master level. There are currently four advanced practice-nursing specialties. They require either an MSN or a PhD level degree with a focus on one of four categories: Nurse Midwife (CNM), Nurse Practitioner (NP), Clinical Nurse Specialist (CNS), or Nurse Anesthetist (CRNA).
Community nurse	Community nursing is nursing care delivered outside acute hospitals, for example in private homes, within General Practice facilities, in community hospitals, in police custody, at school or in residential care homes. In the UK, a community nurse needs a degree approved by the Nursing and Midwifery Council, as well as 1–2 years' experience as a qualified Adult Nurse.
District nurse	District nurses visit patients at home and in residential care homes. They provide increasingly complex care for patients and support for family members.
Licensed practical nurses (LPN)	Bachelor degree not required, professional training.
Mental health nurse (MH)	Nurses with specialized training (for example credentialed by the Australian College of MH nurses).

Table 1: Classification of nursing professions encountered in the literature review

Information Sources & Search Strategy

The search strategy was designed using terms and keywords selected through a scoping review [28] as well as expertise in the subject field. The university librarian designed and adapted the search strategy for each database. There was no date restriction. To be included, studies had to take place in high-income countries (because the PC context in low and middle-income countries is not comparable). The languages searched were English, French and German. The search was carried out in progressive steps (last search in March 2024).

We searched the following databases: MEDLINE Ovid SP, EMBASE, Psych INFO, Cochrane Central, ProQuest, CINAHL, Web of Science, and by citation searching. Grey literature was also researched.

Study Selection and Data Extraction

The librarian used the search strategy defined earlier in the above listed databases. The two reviewers (ND and CC) independently graded each study as “eligible/not eligible/maybe eligible”, based

on title and abstract, using Covidence software. If an eligibility decision could not be made on title and abstract, or if the reviewers disagreed, the full-text article was assessed and a decision was taken. Studies were included if they were deemed eligible based on the full-text by both reviewers.

Data Abstraction and Synthesis

One reviewer (ND) extracted the data of all included studies (Table 2), with further validation by the second reviewer (CC). Data extracted included: first author, year and country, objectives, design, population, and number of GPs interviewed, type of nurses, number of nurses in intervention, intervention or context, type of activities (transfer versus delegation), outcomes (scales or questions), and results (positive, negative, unchanged, mixed, and how). The last column of Table 2 is a (subjective) summary of the main outcome results. We initially intended to extract the demographic data of the GPs.

Data were managed through Endnote (EndNote X8.1) a specific software designed for managing bibliographies.

Outcome	Nb. of GPs (women) surveyed; country, year; (ref.)	Survey methods /instruments	Intervention or context	Results (positive /negative /unchanged/mixed: and how)
GP satisfaction	11 (5); Sweden, 2022 (55)	Semi-structured interviews	General evolution of PC	Mixed: PC physicians and nurses perceived several of their tasks as illegitimate, potentially inflating discontentment and leading to negative work stress. Overall, most PC physicians and nurses found that their individual expertise was appropriately used.
	29; UK, 1996; (56)	Semi-structured interviews	National overall evolution of GP practice with a potential for employing nurses – role expansion for nurses	Positive: GPs identified 4 advantages of employing a PN, including a gain of GP time and services offered.
	≥3; UK, 2001; (57)	Semi-structured interviews; grounded theory approach	Recent PC reforms including inter-professional collaboration with NP.	Mixed: GPs acknowledged the quality of NP care, but there was professional insecurity (loss of autonomy, increased accountability, cost-effectiveness concerns).
	10; USA, 1998; (58)	Semi-structured interviews	General evolution of nurse profession	Mixed: 3 FPs expressed negative perceptions of NPs (concern about autonomy, in particular the prescriptive authority and the ultimate responsibility).
	3?; USA, 2015; (59)	Observations and surveys administered at the end of each pilot day	Pod model: composed of MDs, NPs, PAs, nurses, MAs, a case manager, a behavioral health provider, and operations support staff. To staff the co-visit, ↑ nursing FTEs from 1 to 3 per pilot pod.	Positive: improved satisfaction and work /life balance.
	15; USA, 2016; (60)	Semi-structured interviews	Overall evolution of PC models. All PC physicians but 2 collaborated with NPs regularly and 12 were currently in a collaborative practice agreement with a NP.	Positive (indirect secondary outcome).
	25; Australia, 2013; (61)	Focus group discussions	MH nurses work in partnership with GPs to assist in the assessment and treatment of patients with severe MH problems.	Mixed: many GPs were unclear about program objectives.
	NR (23 practices); USA, 2013; (62)	Visits to high-performing PC practices; observations	Innovations include: 1) pre-visit planning and lab tests; 2) Sharing care among team including nurses 3) collaborative documentation, streamlined prescription; 4) verbal messaging; co-location, meetings.	Mixed: restrictive payment policies and regulations (“only the doctor can...”).
	49; USA, 2010 & 2013; (31, 32)	11 ad hoc questions	In GC, a specially educated RN works at the practice with 2-5 PC physicians, performing 8 clinical activities for 50 to 60 patients.	Positive: After 3 years, 21 out of 22 physicians were satisfied or very satisfied with program, time and effort required, and usefulness of GC nurse. Satisfaction with patient/ family communication (mean 4.9/6.0), management of chronic care (mean 5.0/6.0), and GC model overall (mean 5.5/6.0).
	12; Canada, 1973; (35)	Questionnaire with 67 items	Nurses educated to assume much of PC management as NP, acted as co-practitioners.	Mixed: task delegation increased; among physicians, job satisfaction remained high except for remuneration (legal restrictions not allowing charges for services of unsupervised NPs).
	78 (46); Canada, 2023; (42)	Quantitative non-randomized; online survey about PC models and job satisfaction levels (5-point Likert scale).	PC models (i.e. GPs in solo practice, in collaborative practice, and collaborative practice with GPs and NPs)	Neutral: job satisfaction levels did not appear to be influenced by PC model. 46 % of participants reported choosing their PC models based on preference.
	3; USA, 2015; (33)	Researcher-designed HC team satisfaction questionnaire (9 items, 5-point Likert scale)	RNCC model: integration of a RN care coordinator into a family practice - diabetic patient population (N=937)	Positive: score between 3 and 4 for all items (max =4).
	109; Canada, 1992; (36)	3 ad hoc questionnaires	PHNs attached to FPs' offices (with weekly team meetings); paid by the PH Department.	Positive: greater for physicians with PHN attached (with generalist role, versus non-attached PHN service): 75% very satisfied.
	14; USA, 2023; (37)	Quantitative descriptive; 12-item questionnaire, 4 areas of PCP satisfaction: collaboration consideration, attitude and perception of BHP services, patient/provider accessibility of BHP services, and overall satisfaction with BHP services	Advanced practice RN –led integrated behavioral HC program	Positive: improvements in satisfaction with collaboration but, most notably, in perception of access to and overall satisfaction with behavioral health consultation/patient care services.
	≥1191; UK, 2022; (44)	Tenth National GP Worklife Survey 2019.	Variation in staffing levels across practices: the median practice employed 4.3 FTE GPs, 1.9 nurses.	Unfavorable: Having additional GPs was associated with higher levels of GP satisfaction, whereas additional staff of other types had opposite associations with this outcome.
	1245; Denmark, 2017; (63)	Copenhagen psycho-social questionnaire, 4 point Likert	Task delegation from GPs towards staff (nurse=70%), but type of professionals non-specified.	Positive: a maximum degree of delegation is associated with GPs' overall job satisfaction (OR=1.57 [0.97-2.53], satisfaction with challenges in work, and satisfaction with the working environment (OR=1.61 [0.96-2.68]).
	2013; UK, 1993; (48)	Ad hoc questionnaire (agreement with different statements and experience with PN).	Overall evolution of PC model with an expanding role of PN	Positive: 90% GPs were satisfied with the role of the PN within their practice. (93% wanted to extend their role).
	1624; USA, 2015; (64)	Survey (ad hoc questionnaire) and interviews.	Wide reform of PC system including many changes	Mixed views on increased reliance on NPs (40% positive view among those with a NP in their practice).
	277; New Zealand, 2012; (53)	Brief qualitative assessment; cross-sectional survey and interviews.	New Zealand Primary Health Care Strategy (PHCS) encourages greater teamwork in PHC and supported a wider role for PNs (new model of funding to encourage task delegation and transfer) (Average of 0.98 PNs for each GP in the study).	Positive: improved GP work satisfaction (95.5%). In addition, 98.8% GPs encouraged nurses to expand their role.
	3; Canada, 2007; (54)	Physician work life survey	Broader PHC team to improve access to and quality of PHC services to high needs patients who are elderly and have chronic or complex medical problems. Shared care plan and guidelines.	Slightly positive: little change in overall job satisfaction between baseline and 12 months.
13; Australia, 2016; (65)	Multiple case study; direct observations, semi-structured interviews, questionnaires with 3 validated scales about collaboration: 1) experience (9 items); 2) satisfaction (15 items); 3) beliefs in benefits (5 items).	Collaborative practice models: some NPs worked at the practice and other NPs worked most of the time in the community. Collaboration: when mutual patients were discussed or referred.	Mixed: MPs were satisfied with collaboration (median score 5.4 /6), but reported having blurred perceptions of legal liability and reimbursement of shared care, and a lack of protected time for discussing shared patients.	
GP satisfaction and workload	≥22; Canada, 2008; (66)	Visits and 73 interviews	Family medicine groups	Globally positive, but high heterogeneity across practices. Inter-professional models where nurses had an autonomous clinical activity were associated with higher GP and nurse satisfaction than vertical models (where nurses only executed tasks and had no decision power).
	34; UK, 2017; (67)	Semi-structured interviews	GPs working within NHS England, where expansion of PC has not been matched by increased recruitment or funding in GP.	Mixed: doubts about cost-effectiveness (if more time required by PNs) and about medico-legal implications.
	9; UK, 2004; (38)	Semi-structured interviews	PHC teams: with the intention of more fully meeting the needs of practice populations in a deprived inner-city area.	Mixed: drop in workload, release of GP time, but increase of GP workload with new NP functions, NP having longer sessions, tension between quantity and quality, no prescriptive authority for NPs, ultimate responsibility with the GP.
	1376; Italy, 2009; (43)	Cook–Wall job satisfaction scale (10 items) + work stress inventory (38 items)	Reforms in the National Health Service: PHC teams.	Unchanged: working in a PHCT did not significantly affect job satisfaction or job stress.
	3; USA, 2022; (34)	Pre-post (pilot)	Team-based collaborative models with MAs/LPNs	Positive: improved staff satisfaction, decreased physician administrative work.
	39; Canada, 2015; (39)	Repeated cross-sectional	RIC teamlet model: a FP and a RIC (LPN or MA). The RIC carries out administrative tasks, provides patient triage, clinical support, patient education and follow up.	Satisfaction: positive about many criteria (98% in 2011 and 93% in 2013 for global satisfaction); workload: positive: 95% FPs in 2011 and 96% FPs in 2013 believed that the program helped to reduce workload; but challenge finding time for mentoring RIC.
	276; USA, 1997; (68)	Likert scales; and interview of 22 FPs	Overall evolution of FP practice with increased involvement of NPs and PAs as a possible solution to GP shortage.	Global positive experience: 66% (for NPs) but mixed views on NPs (and PAs): high confidence for preventive and routine care, but concern for taking calls, covering the ER, hospital rounds. 68% FPs would hire a physician rather than a NP or PA if needed.
GP satisfaction and retention	8; Canada, 2014; (69)	3 case studies	NP role in rural collaborative PC practice.	Positive for practitioners in all aspects
GP job satisfaction, burn-out and retention	96; USA, 2021; (40)	Job satisfaction (4-point Likert) + burn-out (item from the Mini-Z burnout study); all 3 outcomes with a single item.	Provider co-management: ≥ 2 providers (interdisciplinary dyads) sharing the responsibility of care management tasks for the same patient.	Positive: with each unit improvement in effective co-management score, there was -7% [95% CI -9 to -4%] for burnout, -5% [-8 to -2%] for intention to leave, and +5% [+ 2 to +8%] satisfaction.
	122 (including USA, 2023; (41)	PCMI: 20-item instrument made up of 3 subscales (4 point Likert)	Provider co-management: ≥ 2 providers (RN-physician dyads)	Slightly positive: weak significant correlation between co-management and burnout (r=-0.24, p = .010), and co-management and job satisfaction (r=-0.00, p = .009), but not intention to leave.

Table 2: Design, Instruments, Country, Intervention or Context, Outcomes and Results of the Studies (Total Number: About 8600 GPs).

Quality Appraisal (risk of bias)

We expected to find a diversity of study designs and therefore assessed the methodological quality of the studies using the Mixed Methods Appraisal Tool (MMAT) [29]. This tool allows assessment with 5 design-specific criteria. We followed the recommendations of the authors for rating each criterion [29]. We synthesized the methodological quality with an overall rating score, ranging from 0 (when 0 criterion was met) to 5 (when all 5 criteria were met). Following this approach, we classified all studies as low quality (LQ, 0-1 /5 criteria met), medium quality (MQ, 2-3 /5 criteria met), and high quality (HQ, 4-5 /5 criteria met) [30]. The two reviewers assessed the risk of bias independently. Cases of disagreement were solved by consensus. The individual results of the MMAT assessment are available upon request.

Assessment of Reporting Biases

We addressed duplicate publication bias by including studies with more than 1 publication only once [31,32]. We (partly) addressed location bias and language bias by searching multiple databases and by including non-English language journals.

Results

The database search yielded 2562 studies. 2498 studies were screened at the stage of abstracts after removal of duplicates, 256 full-text studies were assessed for eligibility and 32 articles were finally included, for a total of 31 studies (Figure 1 and Table 2): 11 qualitative studies, 2 quantitative randomized controlled trials, 1 quantitative non-randomized trial (i.e., including ≥ 1 comparison group), 10 quantitative descriptive (including 1-2 pre-post pilots without comparison group [33, 34]), and 7 mixed methods studies. Twelve studies took place in the US, 7 in Canada, 6 in UK, 2 in Australia, 1 in New Zealand, and 3 in Europe. There were clear interventions in 10 studies [31-41] and among them, 3 with a control group [31,32,35,36]. The intervention or program was led by public health authorities in 2 studies [36,38].

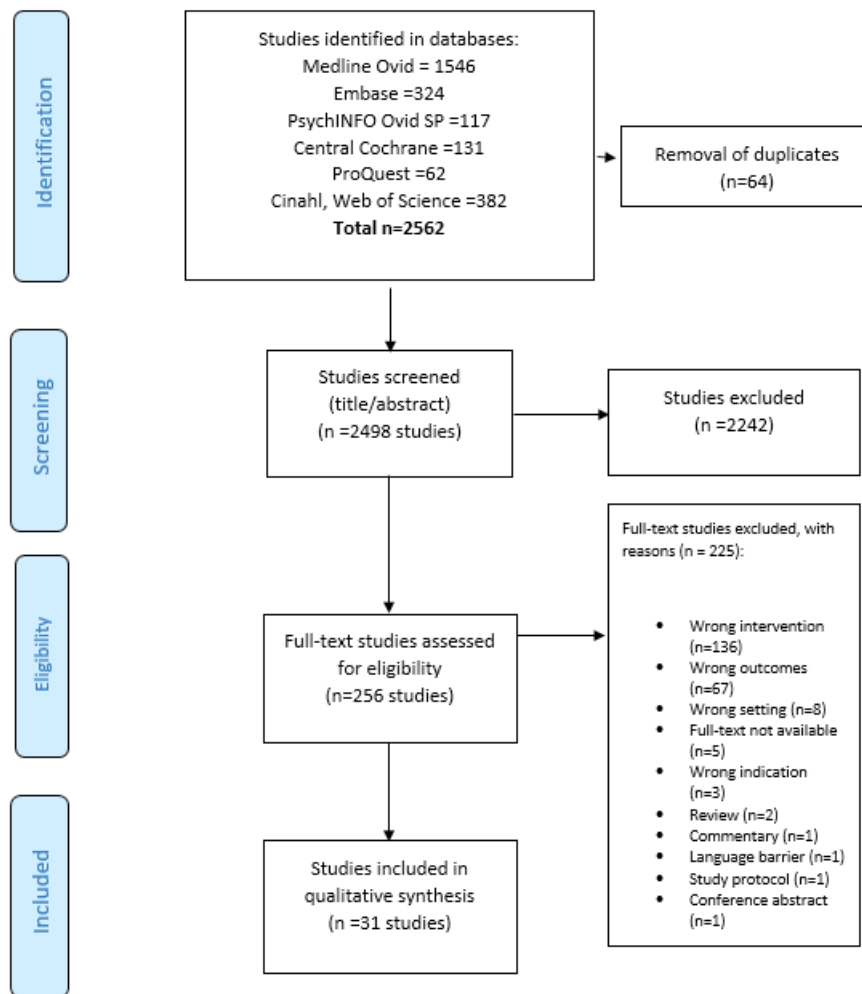


Figure 1: Flow chart of search results

The 31 studies included about 8600 GPs, without much demographic details. There were 21 studies about GP satisfaction, and 7 studies about GP satisfaction and workload. There were 3 studies about GP satisfaction and retention (Figure 2 and Table 2).

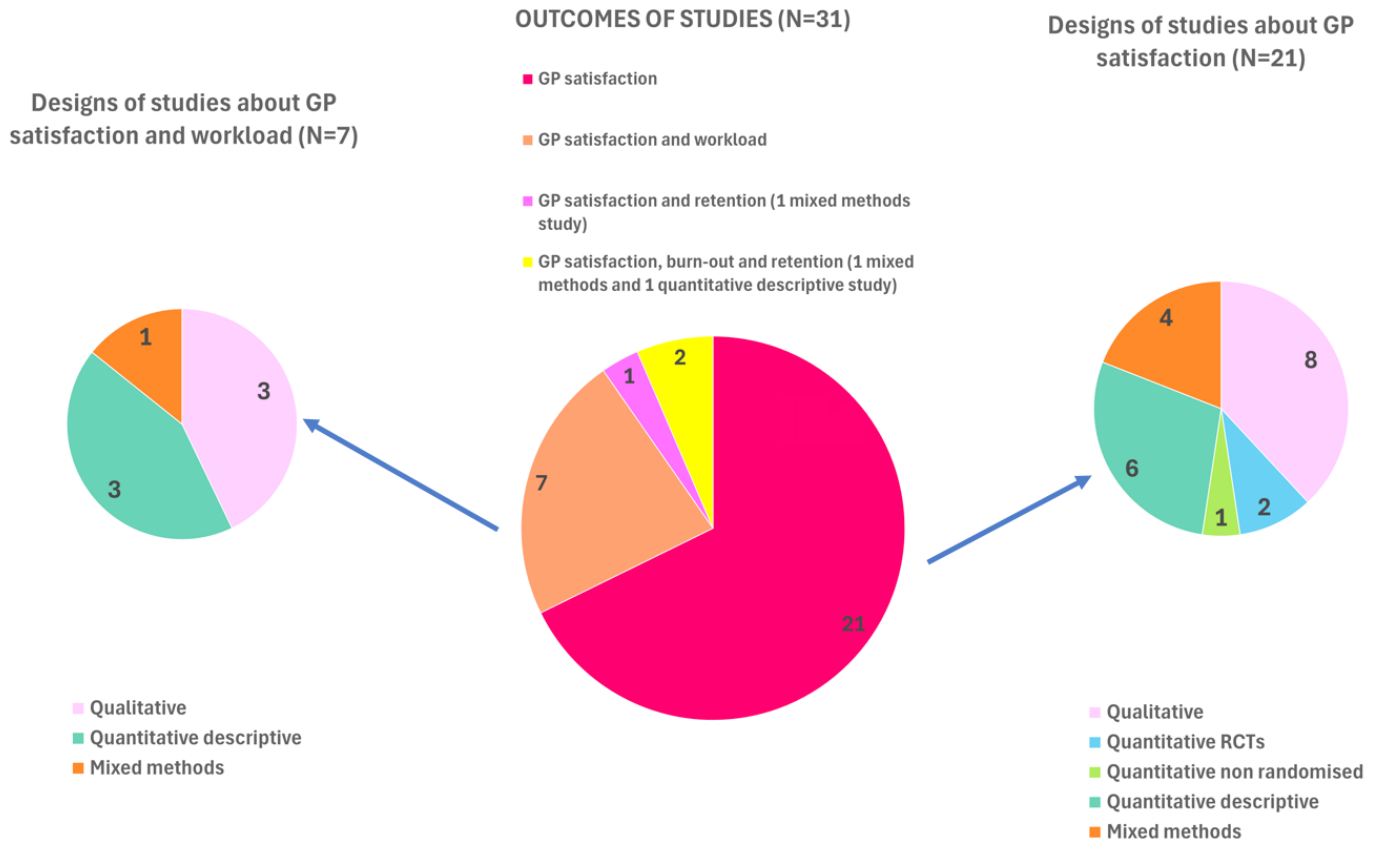


Figure 2: Map of outcomes measured and designs by number of studies.

Synthesis of All Outcome Results

Table 2 shows the outcome results of all included studies. Overall, among the 31 included studies, 18 (58%) yielded positive or slightly positive outcome results, 10 (32%) mixed results, and 2 (6%) obtained unchanged outcome results. [42, 43] In addition, 1 study (3%) yielded unfavorable outcome results [44].

GPs were globally satisfied with the gain of (GP) time and services offered, especially in chronic care, and with their improved work/life balance. In some studies, GPs expressed concerns about cost-effectiveness, reimbursement of shared care, protected time for mentoring the nurse, medico-legal implications (ultimate responsibility with the GP), restrictive payment policies, loss of GP autonomy.

Results were (at most) adjusted for GP age and sex (in rare studies), but no study showed stratified results by age or sex.

Methodological Quality of Included Studies

Concerning the quality, 16 studies (52 %) met the criteria for being HQ, 12 (39 %) for MQ, and 3 (10 %) for LQ (1 RCT). The main methodological weaknesses were small sample sizes (sometimes only 3 participants in pilot studies), the absence of control group in intervention studies, a lack of citations in qualitative studies, a lack of precise outcome results in quantitative studies (when satisfaction was a secondary outcome), and a low participation rate (without comparison of responders and non-responders).

Discussion

The review shows overall satisfaction of GPs with the integration of nurses within their practice.

Factors of Satisfaction for GPs

GPs explained satisfaction with integration of nurses within their practice by several factors, i.e. gain of time and increased

comprehensiveness of provided activities (in particular preventive services and chronic disease management). They recognized that some tasks are more suitable for nurses than for GPs, in view of their skills and ability to develop a holistic approach with the patient, including the possibility to consider their social determinants. The possibility of sharing tasks and responsibilities for patient management, when the legal framework allows it, is also highlighted. This latter may refer to one of the most important components of stress at work models, namely the social support [45].

Factors of Dissatisfaction or Concern for GPs

In a minority of studies, several causes of dissatisfaction or mixed feelings are underlined, as well as barriers to implementation. The sustainability of the way of funding (and thus the concern for cost-effectiveness) and the issue of autonomy and accountability are widely emphasized. The fear of losing their leading position and their privileged relationship with the patient is not often mentioned by the GPs. However, Riisgaard in a literature review about task delegation and professionals' satisfaction reported the loss of continuity as a threat to the professional identity of GPs [46]. Some studies [47,48] have highlighted the need to provide the nurse with equal space and care management resources for a successful integration into the practice (support staff, examination rooms, involvement in decision-making committees, learning opportunities).

Heterogeneity in the PC Model Evolution

The review has shown considerable variation between countries in the evolution of PC models pertaining to interprofessional collaboration, although these countries have broadly similar health systems. Some sophisticated inter-professional models, such as the PCMH in the USA, [33] have been implemented for a long time, and on a large scale. Other countries are just starting, through pilot projects [49], to include non-physician professionals in PC settings.

What Kind of Nurses and What For?

It is difficult to draw conclusions pertaining to physicians' satisfaction based on the kind of nurses introduced into the practice; first, because the comparability between countries may be hazardous, and second, because this is not the focus in most of the studies. However, whatever the kind of nurses, two issues are interesting.

First, the training of the nurses. Some models are based upon a higher level of education for nurses (i.e. master level for APN and NP in particular) when others prefer considering "simply" registered nurses. Second, regarding the activities provided by

the nurses, they either use to provide specialized activities (about diabetes, mental health ...) or very broad activities from health promotion to case management, including punctual clinical care. What is the best option? Probably both, but further studies are needed to investigate this issue.

Finally, these two last points also deal with the issue of the autonomy of the nurses. The legal background and the liability differed across countries, although it seems that the ultimate responsibility remained on the GPs' shoulders in most programs, or it seemed unclear to both the GPs and the nurses. This lack of clarity in the legal framework might be the source of excessive oversight of the nurses' work and waste of GP time. In addition, the lack of sustainability of funding the position of the nurses might have acted as a barrier for the transfer of tasks to the nurses as well. Overall, the results suggest that there should be a clear understanding and agreement on the role of the practice nurse by all stakeholders (the nurse, the GP, the patients, the health authorities, the insurers).

Limitations

Some limitations must be pointed out. First, the satisfaction of professionals, in this case GPs, was often a secondary objective of the study. As a result, its description could have been succinct and imprecise. In this context, we might have misunderstood some studies or their results. Moreover, the outcome was mostly perceptual, with blurred definitions, and not all studies assessed it with a validated tool, which could limit the strength of the results.. The definition of satisfaction is wide and potentially including different aspects or components.

Describing interventions implemented in different countries with different contexts and historical developments is a complex task. The limit between a research intervention and a public health program or a change in health policy is sometimes blurred, thus reducing the possibility to identify specific associations or effects. Our classification of the studies as interventional or observational might be arbitrary.

Additionally, different categories of health professionals exist in different countries, without standardized definitions, which is reflected by the long abbreviation list at the bottom of Table 2 (RN, PN, NP, etc.). The description of their tasks was not always clear and there was no uniform set of tasks across countries or health organizations. Across studies, the nurses were not always new players in private practices, but their roles might have evolved in the context of this intervention. It was not always clear for the reviewers whether the nurses were working in the PC practice or whether it was an external collaboration (residential facilities, community nurses, etc.).

Many included studies were cross-sectional, which limits causal interpretation. Outcome results of the studies were not categorized by age and sex (or, at best, directly adjusted for age and sex), so that gender or generational differences could not be evaluated, although it seems to be important for the acceptability of nurses in PC practices. ND did a qualitative categorization of outcome results, which might have been over-simplified or biased.

Finally, considering the scarcity of negative (or unchanged) results, the question of the publication bias is raised. In view of the cost of salaries (for NPs), programs with unfavorable results might have been interrupted without publication.

Conclusions

The survival of PC in the face of demographic and health constraints depends on interprofessional collaboration and on team-based care [50,51]. Overall, our review identified quite an important number of studies, with different designs, showing despite some reluctance, GPs' satisfaction in integrating nurses within their practice. Many other studies have already reported satisfaction among nurses and benefits for the patients in terms of clinical outcomes and satisfaction. Nevertheless, as Fraher mentioned, team-based care implies retraining physicians and other professionals to this culture. In many countries, practice changes have been implemented first and not anticipated during professional education. However, first the initial training should be rethought [52].

In terms of research, this review did not allow to explore the degree of autonomy of the nurse. The question of transfer of activity versus simple delegation of tasks remains crucial [53]. Regarding this point, the medico-legal implications of task delegation should also be clarified in many countries for a full commitment of both GPs and nurses, as well as the funding of such models. In addition, future steps must work on team compositions and in particular, the ideal proportions of staff of the respective professionals, at least nurse vs. doctor (which may depend on the local context). Finally, there is also the question of co-location. Some studies point out that for effective and regular communication to occur, nurses should work close to the GPs (in adjacent exam rooms). It would also be necessary to compare models involving nurses within the structures versus collaborating with nurses in the community or in the second line [54].

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Ethical Guidelines

Not applicable

Conflict of Interest

The authors declare that they have no competing interests.

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