**Primary care physician perceptions of nurses’ shared responsibility for quality of patient care**

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Running title: PCPs’ perceptions of nurses’ shared responsibilities

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**Abstract**

**Background**

Israel's National Program for Quality Indicators in Community Healthcare was introduced in 2000 with the voluntary participation of the country’s four health plans. Nurses are key players in primary care in Israel, and in the efforts to improve its quality. Still, a 2010 study of the perceptions of primary care physicians' (PCPs) indicated that as many as 40% of the respondents reported that the contribution of nurses to the quality of primary care was moderate, small, or very small.

**Objective**

To examine whether and how PCPs' perceptions of nurses’ responsibility for, and contributions to, the quality of primary care have changed between 2010 and 2020.

**Design** Comparison of responses to two cross-sectional surveys (2010 and 2020), using self-report questionnaires.

**Setting** Four Israeli health plans, covering 100% of the Israeli population.

**Participants** In 2020, 725 PCPs were sampled and 450 completed the questionnaire, for a response rate of 62%. In the 2010 survey, 884 were sampled and 605 completed the questionnaire, for a response rate of 68%.

Self-report questionnaires on PCP’s perceptions of the extent that nurses shared responsibility for improving the quality of care and the actual contribution of their involvement to the quality of care. The data were collected via an internet survey with telephone backup.

**Results**

(a) The proportion of PCPs who do not perceive that nurses make a substantial contribution to the quality of primary care declined from 40% in 2010 to 23% in 2020 (p<.01), while that of PCPs who perceive that the nurses' involvement in practice contributes to quality to a very large extent increased from 17% in 2010 to 25% in 2020 (p<.01). (b) The proportion of PCPs who perceive that nurses share responsibility for improving the quality of medical care increased from 74% in 2010 to 83% in 2020 (p<.01). (c) The proportion of PCPs who believe that psychosocial status affects health status and treatment success increased from 43% in 2010 to 52% in 2020 (p<.01). About half of those who believe so to a very large extent, believe that the nurses are involved in improving primary care quality to a high or very high extent.

**Conclusion**

Over the past decade, there was an increase in the extent to which PCPs perceive nurses to be significant partners in quality improvement. This may be, in part, a result of the growing shortages of staff and other resources, coupled with the physicians’ will to provide appropriate health services, that make it essential for them to share their workload and responsibilities with the nurses.

**Keywords:** Primary care physicians; nurses; quality measurements; community healthcare; quality of care; responsibility

**Introduction**

The delivery of high-quality health services in an era of limited resources is a major issue confronting health systems worldwide [1]. One notable way to advance quality in health is measurement. Quality measurement (QM) aims to gauge key aspects of healthcare, examine its effectiveness and introduce improvement if need be [2]. Many countries have adopted a QM program. Thus, for instance, in the US, the Healthcare Effectiveness Data and Information Set (HEDIS) was developed in 1991 to measure the quality of clinical performance of healthcare providers [3-4]. In 2002, the National Healthcare Quality Report (NHQR) was created in the US to measure the quality of healthcare systems in every state. Similar programs were developed in other developed countries such as Sweden, Australia and Britain [3,5].

In Israel, programs measuring healthcare quality in the community began in 2000 with the voluntary participation of the four health plans and evolved into the National Programfor Quality Indicators in Community Healthcare (hereafter: the National Program) in 2004. The program collects data on preventive, diagnostic and rehabilitative care provided by the health plans in the community and furnishes information to policymakers and the public [6]. It follows national trends at the healthcare level and makes use of some 70 indicators, such as: prevalence of vaccines against pneumonia or Influenza, prevalence of screening for early detection of breast and colon cancer, and control of diabetes, asthma, and selected cardiac problems [6]. Most of the indicators in community healthcare relate to areas that are the responsibility of family physicians. Over time, adjustments are made to the set of indicators to reflect health systems trends and developments. For example, after a 2015 government directive transferred responsibility for mental health from the government to the health plan, quality indicators were added for mental health.

The QM community health programs add to the primary physicians perceived workload [2]. Moreover, the workload in community primary care is growing due to the spread of chronic illnesses and the increase of the elderly population witnessed in recent decades [7]. One way to cope with the increased workload is to have a multidisciplinary staff provide primary care. This has been described in the literature as very helpful in reducing the physician’s workload and improving the quality of care [8-12]. The work of a multidisciplinary staff in primary clinics has proved to be an efficient way to provide high-quality care [13]. Several studies have noted the key role played by nurses as part of a multidisciplinary staff in primary care [14] and as the mainstay of the contact between patients and physicians.

Nurses are significant partners in primary care, responsible for monitoring a patient’s condition and improving the quality of care [15-16]. Indeed, in Israel, they took part in the health plans’ efforts to promote quality of care even prior to the launching of the National Program [17] at all the health plans. The integration of nurses into the program broadened their role, furnished them with diverse tools (including computer knowledge and capability), and empowered them in their work with patients. Studies have shown that the contribution of nurses to the achievement of the National Program’s measurement goals is both unique and important [17].

The development of the role of nurses and their involvement in care in many countries has led, among other things, to the expansion of their authority and training as nurse practitioners. Their broad authority includes the initial examination of a patient and the prescription of medication, as well as changing medication dosage and renewal of prescriptions. The involvement of a nurse practitioner in care is directly related to the quality of care. Dierick-van Daele [18] showed that in the case of minor health problems, nursing care can serve as an economical substitute for a physician’s management of patient care without compromising quality [18-19].

Gualano [16] found that while physicians generally perceived nurses positively, they primarily valued their instructive abilities and interpersonal skills. They saw nurses contributing to the quality of care mainly through their “traditional” role of offering patients support in the psycho-social rather than the medical aspects of care [18-19]. House and Havens found that there is a difference between family physicians and nurses in their perceptions of the nursing role in primary care: Whereas nurses noted the clinical value, physicians tended to identify their role as “supportive” despite their broad training and authority to perform complex treatments [20]. Gualano [16] also showed that physician’s age is an important predictor of how essential they perceived a nurse’s presence alongside the family physician: Older physicians (above 50) perceived joint nurse-physician work as less important. While primary care is still based largely on the physician-focused traditional model of care, younger physicians did exhibit a positive attitude towards a model of enhanced sharing, which may be a promising starting point.

A study conducted in Israel in 2010 on the attitude of physicians towards the contribution of nurses to the improvement of quality of care found that 40% believed the contribution to be moderate or small. Moreover, some 25% felt that the responsibility of nurses for quality improvement was small or very small [6].

Since 2010 there have been a number of developments in Israel in community QM. Among other things, the National Program data of the health plans are now published comparatively. Moreover, there have been changes, in the role of community nurses, including A and B [17]. In light of these changes, the goal of this study was to examine whether there has been a change also in physician perceptions of the extent to which nurses share responsibility for quality care and contribute to the quality of care in the framework of the National Program, in comparison with the survey of 2010.

**Methods**

**Study population**

The study population consisted of all primary care physicians (PCPs) employed by health plans either full- or part-time, and engaged in direct care of adult patients. This included both PCPs who drew a monthly salary and those who worked with the health plans as independent contractors. Physicians in mainly managerial positions and pediatricians were excluded from the study population.

**Sampling**

In 2010, 1,000 PCPs were randomly sampled for the study, 250 from each health plan. Of these, 884 met the study criteria. In 2020, 896 PCPs were randomly sampled for the study, some 220 from each health plan. Of these, 725 met the study criteria. In keeping with the selection criteria, only a small percentage responded that their main job was not in primary care. The combined sample for the study thus numbered 1,609 primary physicians. Representative, stratified random sampling was performed of physicians from the four national health plans.

**Data Collection**

Data collection in 2010 conducted between August and December 2010. In 2010 most of the physicians completed the questionnaire by telephone or received the questionnaire by fax or regular post (86%). Data collection in 2020 began in May 2019 and ended in January 2020. In 2020 most of the physicians completed the questionnaire online (82%). The remainder did so either by telephone or fax. The combined list of sampled physicians from each health plan was examined thoroughly to identify any duplicates and each participant was given a unique link to fill out the questionnaire so that each participant could complete the questionnaire only once.

Before starting the data collection in both 2010 and 2020 each health plan director gave a permission to lunch the study and approach the physicians working in that health plan. All the physicians in the sample received notice by email explaining the study and making it clear that they were under no obligation to complete the questionnaire. The notice was linked to the questionnaire. The physicians were alerted to the possibility of responding by email, telephone, regular post, or fax. Throughout the period of data collection, physicians who had not yet responded received reminders by telephone or email.

**Response Rate and Weighting**

In 2010 605 of the PCPs who met the study criteria – 69% of the sample – completed the questionnaire. In 2020, 450 PCPs - or 62% of the sample - who met the study criteria completed the questionnaire. The main reasons for non-response was refusal to participate in the study (18%) and difficulty in making contact (20%).

Response rate of the combined sample was 65%. The large number of respondents along with the high response rate indicate the quality of the survey.

The data were weighted to adjust for differences across plans in the number of employed nurses and response rates. The weighting was performed in several steps, first the sample ratio was calculated by dividing the number of physicians sampled for the purpose of the study by the number of physicians working in each health plan. Then the standardized number of physicians in each health plan was calculated by multiplying the sample ratio by the number of physicians. Finally, the weight was calculated for each health plan by dividing the standardized number of physicians by the number of interviews conducted in each health plan.

**Instrument**

The questionnaire used in 2020 is an adaptation of the 2010 questionnaire, which was developed under the guidance of a steering committee of experts in the field and relies on sources from the literature dealing with the field and based benchmarks, as described in detail elsewhere (Nissanholtz-Gannot & Rosen, 2012).

The questionnaire for the purpose of the current study focuses on the PCPs’ perceptions of the extent that nurses shared responsibility for the improvement of the quality of care, and the extent of the actual contribution of their involvement to the quality of practice. The physicians were asked: “To what extent do you see the nurses at the health plan as sharing responsibility for the improvement of the quality of medical care, as measured by the quality indicators?” And also: “To what extent do the nurses actually contribute to the quality of your practice, as reflected by the indicators?” The responses were on a scale of 1 (very little or not at all) to 6 (to a very great extent).

In addition, the physicians were asked to grade the extent of their agreement with statements describing the level of their own and the nurses’ responsibility in improvement of the quality indicators. Another question asked to what extent they believed that a patient’s psycho-social condition projects onto their medical condition and the success of medical care, and that follow-up on the quality indicators exacerbates their workload. The PCPs were also asked what portion of their time is devoted to follow-up on their achievements on the indicators and efforts to improve them.

The independent variables related to PCP background and context were: age, sex, specialization, form of employment, and main job in primary healthcare. Other independent variables examined were: perception of the psycho-social state as projecting onto the medical condition and success of treatment, the sense of added burden due to follow-up on the indicators, the time devoted to follow-up on the indicators and efforts to improve them, and the level of responsibility – their own and that of the nurses for improvement of the quality indicators. The key dependent variables were: physician perception of the extent that nurses shared responsibility for the improvement of the quality of healthcare, and of their actual involvement in the quality of the practice.

**Data Analysis**

Various analyses were carried out to explore differences among various physician subgroups and between years. These bivariate and multi-variate analyses used the Statistical Package for the Social Sciences (SPSS), Version 24. First, the relationships between the participants' characteristics and study variables and the year of the study were examined, then multivariate models were examined to identify the predictors of PCPs perceptions and to assess the extent to which the change in key outcome variables could be attributed to the study year. **Ethics**

The study was approved by the Myers-JDC-Brookdale ethics committee. All participating PCPs received an explanation of the study goals, the option to refuse to participate without penalty, and the assurance of anonymity. Similarly, the questionnaire began with a clear statement that its completion constituted informed consent to participation in the study.

**Findings**

*Sample characteristics*

Table 1 presents data on the distribution of respondents’ personal background characteristics (age, sex, nationality, country of birth) and professional characteristics (specialization and form of employment), as well as survey response mode. Note that all differences between the years that are presented in the tables or in the text are significant at the .01 level, unless noted otherwise.

As indicated in the table, in 2020 the older age group, of 60+, constituted a larger percentage of respondents than in 2010 (33% vs 19%); there was greater representation of physicians born in Israel (52% vs 39%); a larger percentage were internists or other specialists (30% vs 20%), and self-employed (38% vs 28%). These differences were controlled for in the proceeding analysis.

Note that the mix of response modes (i.e. the way that the questionnaire was completed) in 2020 differed from that of 2010. In 2020, 82% completed it on online, while in 2010 only 14% completed the questionnaire online, and 86% had completed it by telephone, regular post or fax.

*Physician perceptions of nurses’ shared responsibility for the improvement of quality of care*

In 2020, a large majority of the physicians (83%) regarded nurses at the health plans as sharing responsibility for the improvement of quality of care, to a great and very great extent (see Fig 1). Only 4% believed that nurses shared this responsibility to a small extent or not at all. The proportions PCPs who perceived health plan nurses as sharing responsibility to a great or very great extent increased from 74% in 2010 to 83% in 2020. However, although in 2020 a larger proportions of physicians than in 2010 perceived nurses as sharing responsibility to a very great extent (46% vs 32%), a smaller percentage than in 2010 perceived them as sharing responsibility to a great extent (37% vs. 42%).

*Physician perceptions of the contribution of nurses’ actual involvement in the quality of practice*

In 2020, most physicians (77%) perceived the nurses’ actual involvement as contributing to the quality of practice to a great or very great extent. There was a significant decline in the proportions of physicians (from 40% in 2010 to 23% in 2020) who do not appreciate nurse's contribution to the quality of primary care. The proportions of physicians who perceived the nurses’ actual involvement to a very great extent was higher in 2020 than in 2010 (25% vs 17%). There was no difference between the years in the physicians’ perception of the nurses’ actual involvement as contributing to the quality of practice to a great extent (42%).

Bivariate analyses (Table 2) indicated that a higher proportion of responders in 2020 than 2010 believed that psycho-social determinants affect the medical condition and success of treatment (52% vs 43%); devoted up to 5% of their time to follow-up and improvement of the indicators (48% vs 34%); agreed that they share with the nurses the responsibility for patient care (70% vs 63%), and that they are responsible for performance on some indicators quality of care and nurses for others (64% vs 56%). An increase over the years was also noted for the sense of added burden due to follow-up on the indicators although this difference was less meaningful. About half of the PCPs who thought that the psycho-social state projects onto the medical condition and the success of treatment, also believed that nurses share responsibility to a very high extent.

*Independent predictors of PCPs perceptions of nurses’ responsibility for the improvement of quality of care.*

Older age, male gender, self-employed status and board certification in family medicine were independent predictors of *reduced* perception of nurses’ responsibility for quality of care, while Israeli born and Jewish PCPs were more likely to perceive nurses as sharing responsibility to a very great extent (Table 3). Furthermore, the odds that physicians who believed that nurses actually contribute to a very great extent to the quality of practice, also perceived nurses as sharing responsibility to a very great extent was 7.2 time more than physicians who believed this to a smaller extent. Finally, the odds that physicians who participated in the 2020 study, also perceived nurses as sharing responsibility to a very great extent was 1.2 times more than physicians who participated in the 2010 survey.

*The complexity of the difference between the two years in the background characteristics of the samples*

The study team carried out a series of multivariate models to assess the extent to which the change in key outcome variables between 2010 and 2020 could be attributed to changes in the demographic composition of the sample. For each key outcome variable, we calculated both a basic model in which the only independent variable was a dummy variable representing the year (2020) and a full model which included a broader set of independent variables: age, sex, nationality, country of birth, specialization and form of employment and the year dummy variable. As can be seen from Table 4, only a small proportion of the changes in outcome variables were due to the demographic changes.

**Discussion**

Our findings show an increase in the extent to which physicians perceive that nurses share responsibility for the improvement of the quality of care (74% in 2010 vs 83% in 2020). This finding may be explained by health system responses to major challenges, including the increase in the proportion of the elderly, the rise in complex chronic illnesses, and the growth of a consumer culture that demands responses “here and now” [17]. These challenges have led to the development of preventive approaches to morbidity by, among other things, augmenting health-promotion steps – transferring the focus from the clinical treatment of chronic illnesses to efforts to prevent illnesses such as hypertension, cancer, diabetes and cardiac disease. Health promotion is inseparable from nurses’ role, and as expected they have been improving it considerably.

More generally, the concept of health as the “absence of illness” has evolved in the direction of a concept of health promotion. All the health plans at their own initiative take steps to promote community health and regard nurses as the most suitable professional workforce for the task since they combine clinical knowledge with a pleasant approach to patients [17]. Seen in this light, one can appreciate why physicians regard the role of nurses in the improvement of quality of care as highly important.

For the past 20 years, the health plans have facilitated regular reviews of the quality of preventive, diagnostic, and rehabilitative services that they deliver. The quality indicators are how most health organizations evaluate the standard of medical care provided – from the level of the individual physician to the level of local and district clinic managers – and, among other things, they lead to intra- and inter-organizational competition [25-26]. Moreover, the findings of the quality monitoring program are publicized and fully transparent, with the Nation Program presenting comparative data on the health plans. The public exposure and added weight attributed to the indicators by the health plans have caused physicians to consider nurses as sharing in the quality of care more meaningfully than in the past.

Another main finding is that about half the physicians who believed to a very high extent that the psycho-social state projects onto the medical condition and the success of treatment, also believed that nurses share responsibility for quality improvement to a very high extent.

The psycho-social approach in medicine takes into account that treatment does not consist solely from biological clinical indicators; it also includes aspects of psychological and, indeed, social care [27]. It regards the quality of care that focuses solely on illness as inferior. A deeper, clearer understanding of a medical problem would encourage recommendations for more accurate and effective treatment, reduce unnecessary repeat visits, promote patient safety, and decrease iatrogenic harm [28]. Diabetes and metabolic syndrome are a case in point: without an overall approach relating to aspects beyond the sugar readings, it may be possible to better identify patients requiring prevention and intervention, but it is doubtful that they could be influenced to change their lifestyle and improve the course of their illness and their health. To encourage patients to lose weight, stop smoking, engage in physical exercise, and reduce tension – it is necessary to use essential psycho-social tools.

Gualano [16] noted that physician perceptions of the nursing contribution to the improvement of quality of care focus on their interpersonal skills. Physicians tend to acknowledge the contribution of nurses in their “traditional” role of patient support in psycho-social rather than clinical aspects. It appears reasonable therefore that physicians who attribute importance to the psycho-social aspects of the quality of care also attribute considerable importance to the involvement of nurses in care.

In addition, we found that physicians who felt that quality monitoring adds to the workload to a very great extent, also were more likely than other physicians to perceive nurses as contributing to their practice to a great or very great extent (OR =1.3).

The workload of primary physicians has increased in recent years – and is expected to grow still, with the rise in complex morbidity. More conditions today are defined as an illness requiring the intervention of the family physician: pre-diabetes, pre-hypertension, preventive nephrology. In these cases, healthy patients are identified as being at risk of developing the illness in the future. Physicians are required to summon, counsel and sometimes also treat and follow up on patients who in the past were not actively monitored.

The ability to achieve better balance in a chronic illness in community medicine demands far more than mere measurement and technical referrals: it demands the performance of complex follow-up including time to talk, explain and build a physician-patient relationship of trust, as well as repeat visits, and close monitoring especially in the early stages of diagnosis of a new illness.

In a report published in 2013 on strengthening public health, the Israel Medical Association contended that the heavy workload of community physicians has reduced clinic visits to five minutes in which time it is impossible to deliver care of the highest quality [7]. A report from 2016 claims that about 70 patients are seen a day [32].

One Israeli study [33] recommends that to deal with physician burnout due to overload, teamwork should be introduced to enhance the physician’s sense of meaning in work, and job satisfaction and, concomitantly, to improve quality and patient satisfaction. The explanation for this finding is that in light of the family physician’s responsibility for a patient, it may be assumed that despite their workload, various aspects of care, such as follow-up on chronic patients, could be transferred to another party if the physician feels that the level of care provided would not be inferior to their own. Thus, as their workload increases, physicians perceive nurses as more important, and nurses assume greater responsibility for various time-consuming aspects of care.

The escalation of chronic illnesses, on the one hand, and the workforce shortage, on the other, have created both a challenge and an opportunity for community nurses to expand their role. Their activities are visible, enabling physicians to appreciate their professional work more so than in the past.

Escalation of chronic illnesses coupled with increasing shortage of workforce constitute an opportunity for nurses to expend their role. This leads to more acceptance and appreciation of physicians for the nurses’ contribution to quality of care.

Therefore and under the circumstances nurses enjoy recognition in their professional and moral contribution to the people in general and to the medical world in particular.

**Recommendations**

Considering the steady increase in the various medical quality measurements as well as the growing shortage of medical staff, it is more and more difficult to convert the new numerous quality measurements into practice.

However, during the last decade the medical world has regarded and excepted nurses worthy and practically indispensable partners to evaluate and advance the quality measurements.

Therefore, in order to continue with consents efforts to give quality treatment we recommend the nurses will be granted more and more responsibilities, and will maintain close cooperation with physicians

A continuing study should be conducted to empirically examine the link between the nurses’ level of involvement in the quality indicators and the change in that measure over several years.

**Limitations**

Some of the demographic parameters had been different from those basically considered at the 2010 research: i.e- ages, birth origin, profession and occupation.

however, while making the final analysis of the later research results the researchers took them into accounts and statistically balance them of against the previous results.

but it could be that the obvious different between the results of the two researches had had some impact and influence on the physician perception of nurses role in the general picture.

**References**

1. Kruk ME, Gage AD, Arsenault C, Jordan K, Leslie HH, Roder-DeWan S, et al. High-quality health systems in the Sustainable Development Goals era: time for a revolution. J Lancet Glob Health. 2018; 6196–252.

2. Nissanholtz-Gannot R, Rosen B, The Quality Monitoring Study Group. Monitoring quality in Israeli primary care: The primary care physicians' perspective. Israel J of Health Policy Research. 2012; 1,26. Available from: https://ijhpr.biomedcentral.com/articles/10.1186/2045-4015-1-26.

3. Jakovljevic M, Vukovic M, Chen CC, Antunovic M, Dragojevic-Simic V, Velickovic-Radovanovic R, et al. Do health reforms impact cost consciousness of health care professionals? Results from a nation-wide survey in the Balkans. Balkan Med J. 2016; 33(1):8–17.

4. National Board of Health and Welfare and the Swedish Association of Local Authorities and Regions. Quality and efficiency in Swedish health care – regional comparisons. [Internet]. 2013. Available from: <http://www.socialstyrelsen.se/publikationer2013/2013-5-7>

5. Sutherland K, Coyle N. Quality in healthcare in England, Wales, Scotland, Northern Ireland: an intra-UK chartbook. 2009. Available from: <http://www.health.org.uk/sites/default/files/QualityInHealthcareInEnglandWalesScotlandNorthernIreland_IntraUKChartbook.pdf>

6. Nissanholtz-Gannot R, Goldman D, Rosen B. How do primary care physicians perceive the role of nurses in quality measurement and improvement? The Israeli story. Frontiers in Public Health. 2016;4. Available from: https://www.frontiersin.org/articles/10.3389/fpubh.2016.00124/full

7. Emdat ha-Histadrut ha-Refuit be-Yisrael le-Va’adat Sarat ha-Briut, H”K Yael German le-Hizuk Ma’amada shel ha-Refua ha-Tziburit [Israel Medical Association position paper to the Committee of Health Minister MK Yael German Committee, to Strengthen the Public Healthcare System]. [Internet]. 2013. Hebrew. Available from: <https://www.health.gov.il/services/committee/german/doclib/25072013_1.pdf>

8. Shaw A, de Lusignan S, Rowlands G. Do primary care professionals work as a team: a qualitative study. J Interprof Care. 2005;19:4-396.

9. Walsh JME, McDonald KM, Shojania KG, Sundaram V, Nayak S, Lewis RI, Goldstein MK. Quality improvement strategies for hypertension management: a systematic review. Medical Care. 2006;44(7):646-657. Available from: https://journals.lww.com/lww-medicalcare/Abstract/2006/07000/Quality\_Improvement\_Strategies\_for\_Hypertension.6.aspx

10. Schadewaldt V, McInnes E, Hiller J, Gardner A. Views and experiences of nurse practitioners and medical practitioners with collaborative practice in primary health care – an integrative review. BMC Fam Pract. 2013;14:132.

11. Shoemaker SJ, Parchman ML, Fuda KK, Schaefer J, Levin J, Hunt M, et al. A review of instruments to measure interprofessional team-based primary care. J Interprof Care. 2016;30:423–432.

12. Pullon S, Morgan S, Macdonald L, McKinlay E, Gray B. Observation of interprofessional collaboration in primary care practice: a multiple case study. J Interprof Care. 2016;30:787–794.

13. Johnson JE. Working together in the best interest of patients. J Am Board Fam Med 2013;26:241–3.

14. Peterson LE, Phillips RL, Puffer JC, Bazemore A, Petterson S. 2013: Most family physicians work routinely with nurse practitioners, physician assistants, or certified nurse midwives. J Am Board Fam Med. 2013;26:244–5.

15. Schöttle, D, Schimmelmann, BG, Karow, A, Ruppelt, F, et al. Effectiveness of integrated care including therapeutic assertive community treatment in severe schizophrenia spectrum and bipolar I disorders: the 24-month follow-up ACCESS II study. The Journal of Clinical Psychiatry. 2014;PMID:25188752.

16. Gualano, MR, Bert, F, Adige, V, Thomas, R, Scozzari, G, Siliquini, R. Attitudes of medical doctors and nurses towards the role of the nurses in the primary care unit in Italy. [Internet]. Prim Health Care Res Dev. 2018;19(4):407–15. Available from: <https://doi.org/10.1017/S1463423617000846>

17. Nissanholtz-Gannot R, Rosen B, Hirschfeld, M. Tmurot be-Avodat ha-Ahot ba-Kehila be-Yisrael. [Changes in the work of the community nurse in Israel]. Bitahon Soziali 2016;99:121-47. Hebrew-

Nissanholtz-Gannot, R., & Rosen, B. (2012). Monitoring quality in Israeli primary care: The primary care physicians' perspective. *Israel Journal of Health Policy Research*, *1*(1), 1-13.‏

. 18. Dierick-van Daele AT, Metsemakers JF, Derckx EW, Spreeuwenberg C, Vrijhoef HJ. Nurse practitioners substituting for general practitioners: randomized controlled trial. J Adv Nurs. 2009 Feb;65(2):391-401.

19. Laurant, M, Reeves, D, Hermens, R, Braspenning, J, Grol, R, Sibbald, B. Substitution of doctors by nurses in primary care (Review). 2007. The Cochrane Collaboration, John Wiley & Sons, Ltd.

20. House S, Havens D. Nurses' and physicians' perceptions of nurse-physician collaboration: a systematic review. J Nurs Adm. 2017 Mar;47(3):165-71.

21. The Israel National Program for Quality Indicators in Community Healthcare. 2020. Available from: <https://www.israelhealthindicators.org>

22. Horrocks S, Anderson E, Salisbury C. Systematic review of whether nurse practitioners working in primary care can provide equivalent care to doctors. BMJ, 324:819-23.

23. Sakr M, Kendall R, Angus J, Saunders A, Nicholl J, Wardrope J. Emergency nurse practitioners: a three parts study in clinical and cost effectiveness. Emergency Medicine Journal, 2003;20 (2):158-63.

24. Bauer, JC. Nurse practitioners as an underutilized resource for health reform: Evidence-based demonstrations of cost-effectiveness. J Am Acad Nurse Pract. 2010; 22(4):228- 31.

25 . Fischer M, Wagner O, Keinar T, Sholet I. Eikhut Refuit u-Madadeha – Kriya le-Hashiva Erkit Mehudeshet? [Medical quality and its indicators – a call to rethink values] ha-Refuah. 2015 Sep;584-8. Hebrew.

26. Madadei Eikhut le-Refuat ha-Kehila be-Yisrael. [Quality indicators for community medicine in Israel]. 2018. The Israel Medical Association (position paper). Available from: <https://www.ima.org.il/userfiles/image/Ne106_madadeyEichut.pdf>. Hebrew.

27. Margalit APA, Glick SM, Benbassat J, Cohen A. Effect of a biopsychosocial approach on patient satisfaction and patterns of care. J Gen Intern Med. 2004;19(5p2):485-91.

28. Margalit APA, Elad A. Costly patients with unexplained medical symptoms: a high-risk population. Patient Educ Couns. 2008;70:173-8.

29. Krumholz HM, Lee TH. Redefining quality — implications of recent clinical trials. NEJM. 2008;358:2537-9.

30 . Margalit APA, Elad A. Refuah shlema. Ha-model ha-biopsychosoziali be-refuah. [Full recovery. The biopsychosocial model in medicine] Available from: The\_biopsychosocial\_model\_in\_medicine#cite\_note-.D7.94.D7.A2.D7.A8.D7.945-16.

31. Yodfat Y. A new method of teamwork in family medicine in Israel with the participation of nurses as physicians' assistants, AJPH. 1972;7:62.

32. Omes be-refuat ha-kehila ve-hishtalmuyot. [Overload in community medicine and on-the- job training]. Israel Medical Association (report) against the Arrangements Law 2016. Available from:<https://www.ima.org.il/Heskem/ViewCategory.aspx?CategoryId=5387>

33 . Lieberman-Azuz N, Goldstein R, Gever A. Refuat mishpaha – ma hishtana ba-tzipiyot uva-sviut ha-ratzon.[Family medicine – what has changed in expectations and satisfaction?]. The Israel National Institute For Health Policy Research. 2018. Available from: <https://israelhpr.org.il/research>

**Table 1: Characteristics of participants in 2010 survey and 2020 study, in %**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **2010** | **2020** |  | **2010** | **2020** |
| **Age**  Under 45  45-60  60+ | 25  57  19 | 17  50  33 | **Board certification**  Family medicine  Internist / other  Non-specialist | 41  20  39 | 35  22  43 |
| **Sex**  Female  Male | 44  56 | 40  60 | **Employment**  Salaried  Self-employed  Both | 47  28  25 | 42  38  20 |
| **Nationality**  Jewish  Non-Jewish | 76  24 | 71  29 | **Occupation**  Primary physician  Specialist | 92  8 | 88  12 |
| **Country of birth**  Israel  Other | 39  61 | 52  48 | **Response mode**  Online  Not online\* | 14  86 | 82  18 |

All the differences between the years were significant, at the level of p<.001.

\* Physicians were interviewed by telephone or received the questionnaire by fax or regular post.

**Table 2: Bi-variate analysis of the association of the independent variables with physician perceptions of nurses’ shared responsibility for the improvement of quality of care by years of study.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Primary care physicians' response to survey items** | **Primary care physicians' belief that nurses share responsibility for quality of care to a very great extent (%)** | | |
|  | **Total** | **2010** | **2020** |
| **Psycho-social state affects medical condition**  **and success of treatment**  To a very great extent  To a great, moderate, small, very small and not at all | 49  32 | 43  26 | 52  39 |
| **Follow-up on indicators increases work overload**  To a very great extent  To a great, moderate, small, very small extent and not at all | 44  38 | 42  29 | 46  46 |
| **Time devoted to follow-up and improvement of scores on indicators**  Up to 5% of the time  More than 5% of the time | 43  39 | 34  32 | 48  45 |
| **Nurses contribute to quality of care**  To a very great extent  To a great, moderate, small, very small and not at all | 83  28 | 78  23 | 86  33 |
| **Nurses share with me the performance measured**  Definitely agree  Agree, don’t really agree, disagree, don’t agree at all | 68  21 | 63  17 | 70  25 |
| **I am responsible for the performance of some indicators and nurses, for others**  Definitely agree  Agree, don’t really agree, disagree, don’t agree at all | 61  33 | 56  27 | 64  38 |

All the differences between the years are significant at the level of p<.001.

**Table 3: Logistic regression of physician perceptions of nurses’ shared responsibility for quality of care, to a very great extent**

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Entered as | Reference group | Odds ratios for perceived nurses' sharing of responsibility for Quality of Care |
| Age, years | 45-60 | <45 | **0.6** |
|  | > 60 | **0.7** |
| Background | Jewish | Non-Jewish | **1.9** |
|  | Israeli-born | Non-Israeli-born | **2.8** |
| Gender | Male | Female | 0.9 |
| Board certification | Family physician | non-certified | **0.8** |
|  | Internist / other | **1.3** |
| Form of employment | Salaried | Self-employed | **1.2** |
|  | Both salaried and self-employed | **1.3** |
| Year of survey | 2020 | 2010 | **1.2** |
| Attitude to follow-up of quality of care | Increases work overload to a very high extent | Increases work overload to a low extent | **1.2** |
|  | Commitment of less than 5% of time to indicators | Commitment of less more than 5% of time to indicators | **1.3** |
| Psycho-social state projects onto medical condition2 |  |  | **1.7** |
| Shared physician-nurse responsibility3 |  |  | **1.4** |
| Full physician-nurse shared responsibility3 |  |  | **4.9** |
| Nurses actually contribute to quality of practice2 |  |  | **7.2** |
| Cox and Snell R2 |  |  | 0.32 |
| Nagelkerke R2 |  |  | 43 |
| N (non-weighted) |  |  | 605 |

The regression included two dummy variables representing the different health plans and forms of questionnaire completion.

All the included variables have a correlation coefficient no higher than 0.04 with doctor's perceptions.

\*\* The significant coefficients are in bold

1 In 2020

2 To a very great extant

3 Completely agree

**Table 4: Coefficients of the 2020 year dummy in basic and full models**

|  |  |  |
| --- | --- | --- |
| Outcome variable | Coefficient in basic model | Coefficient in full model |
| nurses' sharing of responsibility for Quality of Care | **1.7** | **1.7** |
| Nurse contribution to quality of practice | **1.6** | **2.0** |
| Psycho-social state projects onto medical condition | **1.9** | **2.1** |
| Full physician-nurse shared responsibility | **1.6** | **1.7** |

\*\* All the coefficients were significant the level of p<.001.

**Figure legend**

**Fig 1. Distribution of perceived shared responsibility of nurses for the improvement of quality of care, at two points in time. P<0.001**

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