Received: 24 August 2021 | Revised: 15 November 2021 | Accepted: 22 November 2021

DOI: 10.1111/jnu.12754

Journal of Nursing Scholarship

Diabetes nurse practitioners in the shadow of the COVID-19 pandemic: Challenges, insights, and suggestions for improvement

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Funding information
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Abstract

Purpose: The study examined the role of diabetes nurse practitioners (DiNPs) and their contribution to the quality of care of individuals with diabetes during the COVID-19 pandemic. Specifically, we examined the benefits and barriers of using telemedicine for managing diabetes.

Design: A descriptive qualitative research using content analysis of interviews.

Methods: Participants were invited through the National DiNPs' Forum. Semi-structured interviews were conducted with 24 licensed DiNPs (age range, 37–58 years) who were involved in the clinical care of individuals with diabetes during the COVID-19 pandemic. The interviews were recorded and transcribed, and content analysis was then used for extracting themes and their related categories.

Findings: Content analysis revealed five themes: (a) Benefits and barriers of remote diabetes treatment; (b) Teamwork and its implications to DiNPs; (c) Technological challenges, resourcefulness, and creativity; (d) Changed perception of DiNP roles; and (e) Cultural diversity and improving communication skills. The benefits of telemedicine included improved control, efficiency, convenience and satisfaction, while the disadvantages of this method included the inability to provide optimal practical guidance on technical aspects of physical assessments and care. Sectors with limited digital literacy and language barriers had difficulties using telemedicine. Teamwork was reported as a facilitator to managing treatment. Telemedicine provided an opportunity for DiNPs to become more efficient and focused and to clearly define their role in the organization.

Conclusions: The COVID-19 pandemic has posed new challenges. Along with the need to adapt the therapeutic approach to remote care, DiNPs improved their professional status, acquired new skills, and were satisfied with their personal and professional growth.

Clinical relevance: Telemedicine should become an integral part of diabetes management to enable access to populations who cannot come to the clinic. Patients should be guided on using telemedicine platforms.

KEYWORDS
COVID-19, diabetes management, nurse practitioner, qualitative study, telemedicine

INTRODUCTION

On March 11, 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a pandemic. Governmental restrictions and lockdowns of entire populations affected health systems and disrupted the routine treatment and follow-up of non-COVID-19 patients (Ohannessian et al., 2020). To meet and adequately address the medical needs of most patients, while reducing patients' and caregivers' risk of infection, health systems had to start providing remote medical services (telemedicine) immediately (Chang et al., 2021; Dhaliwal et al., 2021; Wilhite et al., 2021).

Before the COVID-19 pandemic, telemedicine was used by some healthcare organizations in Israel and in other countries for monitoring, counseling, and therapeutic education (Itzhak et al., 1998; Thiyagarajan et al., 2020; Wang et al., 2020). Telemedicine services for diabetes management include the use of continuous glucose sensors, insulin pumps, and other devices, mobile apps, and software solutions to support decisions and to process and visualize information about the achievement of treatment goals (Aberer et al., 2021). These technologies allow caregivers to analyze patient data and make informed decisions about treatment without physically meeting the patient.

Nurses play an important role in managing diabetes treatment remotely. In the past, the provision of remote medical services by nurses has been shown to be effective in achieving therapeutic goals. A meta-analysis of twelve studies on nurse-led tele-coaching of 3030 participants with type 2 diabetes mellitus has found that these interventions can contribute to the improvement in glycemic control and blood pressure (Chen et al., 2019).

Persons with diabetes were among the most vulnerable groups affected by COVID-19. This population was at high risk of becoming seriously ill if infected (Rawshani et al., 2021; Taher et al., 2020) and at risk of neglecting care due to social isolation and reduced availability of health services (Beran et al., 2021; Kiran et al., 2020). Thus, the need arose for wide implementation of telemedicine to treat patients, to provide patient education, to monitor disease and treatment compliance, and to solve problems.

In Israel, diabetes nurse practitioners (DiNPs) are an integral part of a multidisciplinary medical team. They promote diabetes control by providing guidance and patient education, detect complications, provide treatment and care, refer patients to appropriate medical professionals, and advise other caregivers (MOH, 2015). Digital technologies are used by DiNPs for supporting and caring for patients (Balestra, 2018).

After the COVID-19 outbreak, DiNPs continued to take an active part in treating persons with diabetes in hospitals and in the community. They have also been remotely monitoring, mainly through telemedicine, home hospitalized, and quarantined patients. Despite the recognized advantages of telemedicine, information about the benefit of "remote" versus "face-to-face" encounters, their accessibility, and cultural adaptation to different populations are lacking. We conducted a qualitative study to examine the role of DiNPs during the COVID-19 pandemic, and their contribution to the quality of care of individuals with diabetes. Specifically, we examined the benefits and barriers of telemedicine for managing diabetes.

METHODS

Design and participants

This descriptive qualitative study using content analysis of interviews was conducted among DiNPs who treated persons with diabetes during the COVID-19 pandemic. The purposive sample was recruited from the National DiNPs' Forum. We used e-mail and phone to contact DiNPs and invite them to participate in an interview. DiNPs who were on long leave from work due to illness or other reasons were not included in the study. Twenty-four of 28 nurses contacted agreed to participate (85% response rate).

Data collection

Each participant was interviewed using a semi-structured interview by one of four DiNPs who are members of the study's steering committee. Before starting the interviews, the interviewers held two meetings to agree on their positions and simulate an interview according to the interview guide (Appendix 1). The interview questions were guided by the research aims and research questions of this study. Each interviewer interviewed 4–5 participants via the "Zoom" app (www.zoom.us). Each interview lasted 45–60 min and was recorded and transcribed by a third party. All personal data were coded; the personal details of the participants did not appear in the transcription.

Data analysis

The transcribed interviews were analyzed by an external psychologist (PhD, female), who specializes in qualitative content analysis. Content analysis was concluded in an inductive way from text units (Creswell, 2014). The analysis unit was a word, a phrase or a sentence related to the purpose of the study, the research question, and the investigated issues. First, the researchers looked for similarities and differences among the participants' various statements. Similar statements were classified under the same category according to

their compatibility with the research topic (Kacen & Krumer-Nevo, 2010). Second, the collected data were classified according to the themes raised (Lincoln & Guba, 1985).

The study's rigor was maintained by ensuring the trustworthiness and credibility of the data collected and analyzed (Lincoln & Guba, 1985). Trustworthiness was ensured by the authenticity of the data, which was collected from DiNPs with professional experience >5 years who were fully assimilated in the issues under study. Credibility was ensured by systematic content analysis followed by cross-checking by an expert in qualitative data analysis. The validity of the interpretations was sustained using respondent validation during the interview and data analysis, and constant comparisons enabling researchers to apply a comprehensive approach to the findings from the interviews (Anderson, 2010).

Ethical considerations

The study was approved by Tel Aviv University's ethics committee (#0001717-1). The researchers explained to the participants that the information they provide would be kept confidential. The recorded data were kept in a code-lock computer that could only be accessed by the interviewer. The recordings were deleted after the study report was completed. An information sheet with the contact details of the study coordinator and the study aims and was sent to the participants.

FINDINGS

Participant characteristics

Twenty-four of 32 registered DiNPs in Israel participated in the study. The participants' age ranged from 37 to 58 years, and all of them had a master's degree. Twelve of them work in diabetes clinics in the community, ten work in designated diabetes clinics in hospitals, and two work in both hospital and community clinics. Nine participants are also senior diabetes coordinators in their organization. Six participants work in northern Israel, 12–in central Israel, and 6–in southern Israel.

Qualitative findings

Data analysis revealed five key themes related to the characteristics, contribution, and challenges of DiNPs' clinical practice during the COVID-19 pandemic.

Theme 1: Benefits and barriers of remote diabetes treatment

The COVID-19 pandemic forced DiNPs to provide remote care using telemedicine platforms for the first time. Most DiNPs were very satisfied with this innovation. "*For me, it was a pleasant surprise, we can help even if we do not meet face-to-face*" (Interviewee #1). This change exposed the DiNPs to new approaches and additional ways of providing care. "*I have learned to recognize that there are other ways to provide quality and optimal care to patients, we have learned much about making the best use of the remote visit resource*" *(#5).* The remotely arranged sessions enabled more efficient management of the therapeutic process. "*There is an advantage to remote consultation: it can be much more practical and focused*" (#17 and #1). The interviewees perceived the transition to remote care as a refreshing change representing a successful combination of using advanced technology together with a new clinical challenge.

The perceived benefits of telemedicine also included an improvement in DiNP's professional status and recognition of their capabilities in relation to patient care. Interviewee #7 noted: *"Because we all became engaged in it, it's an advantage because it propelled the whole system forward"*. The ability to provide optimal treatment while maintaining continuity of care and personal service stood out in the interviews, emphasizing flexibility and focus on patient needs. "*The main advantage was the ability to continue treatment and follow-up of patients with diabetes while building a personal plan for each one. Although people were in quarantine and despite the restrictions, continuity of treatment was maintained*" (#5 and #9).

Telemedicine was the preferred route to maintain safety and prevent infections. "*The benefits are that patients are not exposed to infection during this time, and it is a tremendous advantage that counseling can be done over the phone*" (#9). The interviewees perceived that caregiver safety was higher. "*There is no fear of infection [of staff]* " (#19). Along with the benefits, the nurses also listed disadvantages and barriers to making clinical assessments and interventions—mainly due to the lack of human contact with patients. The inability to put a hand on the patient's shoulder, to learn about non-verbal messages, to encourage and reassure patients, was a recurring theme in most interviews. *"But there was no doubt that human contact with patients is lacking, for example, putting a hand on the shoulder"* noted #1. Interviewees mentioned difficulty in gathering non-verbal information and managing emotional aspects of patient-carer communication. *"You get a more complete picture on face-to-face visits, and the ability to empathize, to be with the patient, and to understand the full picture is greater." (#4 and #1).* Participants noted that virtual meetings required greater effort along with a sense of distancing, impairing the delicate nurse-patient relationship. *"It is more difficult than face-to-face [meetings]because it requires greater emotional and mental investments, I find it really difficult, it comes at the cost of intimacy*" (#4).

Another challenge was the practical difficulties in making clinical assessments "*There are things that can only be done in a face-to-face meeting, such as a foot examination and an eye examination*" (#5), or demonstrating injection techniques or use of devices: "*Sometimes it is not clear enough, you cannot see when you want to teach injection methods, it's very limiting*" *(#13).* Interviewee #20 underlined the difficulty of taking full responsibility for remote clinical practice: "*It's a lot of responsibility to instruct through telemedicine how to connect*

an insulin pump, guide the patient when I'm not next to him. I think it borders on irresponsibility; we need to distinguish when it is appropriate and when it is not".

Theme 2: Teamwork and its implications to DiNPs

Individuals with diabetes are treated by a multidisciplinary team that includes a diabetes physician, a DiNP, a dietitian, and a social worker. Analysis of the interviews revealed different teamwork patterns. DiNPs reported productive teamwork in some clinics while in others they felt alone. In some cases, the team component became stronger after the start of the pandemic: "*Each team member has his own statement, dietitians examine the issue of carbohydrates counting, etc. We had amazing visits; I did not believe it was possible to reach such a level*" (#1). Another DiNP emphasized the contribution of multidisciplinary thinking: "*The multidisciplinary discussion during the pandemic was extremely important, we sat together and everyone contributed his part" (#4).* The multi-professional discourse regarding the effects of the pandemic enabled mutual learning and personal development. "*Sitting with team members and hearing what they say, it enriches the attitude and acquaintance, although we have worked together for years and know each other*" (#4). The difficulties and challenges drove a search for new solutions. *"We started having joint visits with a dietitian and a physician due to technical constraints, but in the end good things came out of it; each of us examined the points that are important to him/her, we identified the problems and made changes. Perhaps this is a technique that needs to be refined and taken forward.*" (#4). The learning process of working in this new format is expected to continue as further adjustments are made.

New methods for gathering information and communication within the teams were learned. "*We learned that sometimes it is possible to do it gradually: someone conducted a visit, passed the baton to another staff member when he recognized the need for this, and called the patient later. Then the information was passed to the rest of the team that had to meet the patient, and each of them gave the recommendations individually to the patient*" (#7). The interviewees reported team effort and willingness to contribute beyond the necessary while looking for appropriate solutions to the unconventional situation that had arisen. "*The teams were conscripted, and in a short time each team had determined the best working and communication management methods for it*" (#5).

The challenges of teamwork during the pandemic were also raised, especially concerning coordination among professionals who provided remote counseling separately. This was a difficult matter for some of the patients, especially when several team members contacted the same patient separately on the same day. This stood out in clinics in which teamwork was not coordinated and even created conflicts with some of the patients. "*Sometimes we also received feedbacks that … the patient wastes an entire day on consultations that are not always necessary*" (#7). Other interviewees added: "*It's difficult for the patient. On the day of the visit the patient received three phone calls. [In contrast] when the patient arrives physically [at the clinic] he moves from room to room and receives the recommendations and guidance. We often had to leave out [a meeting] with a team member so as not to overload [the patient].*" (#8 and #9). Some interviewees noted that teamwork in some clinics was unsuccessful, especially due to duplication of operations and difficulty in coordinating treatments. "*The issue of sharing the clinic to make the treatment more multi-team. This is not possible on a daily basis*" (#23).

The interviews related to the influence of the pandemic on team members. Although most patients hardly came to the clinics, being in the clinic and the fear of being infected were accompanied by mental stress. The teams experienced anxiety when they worked in a stressful and demanding environment. "Many *staff members were very anxious and overloaded, so there were some who reacted differently than usual, perhaps because these are things that don't happen on a daily basis, more stressful*" (#24). The DiNPs were further burdened by the absence of caregivers for various reasons such as quarantine due to illness or exposure to COVID-19. "*There were a lot of workers who were in isolation, and it made things difficult. The burden has risen due to illness and absence of some staff members*" (#22). In clinics that remained open, coordinating between those who worked from home and those who worked in the clinic created additional challenges: *"Some caregivers were not physically here and worked remotely, which made it difficult to coordinate and communicate with the team*" (#22).

Theme 3: Technological challenges, resourcefulness, and creativity

Flexibility and making services accessible to technology-challenged patients

One of the challenges of remote care was related to the difficulty of some patients in using digital technologies. The nurses reported a commitment to address these populations. "*It is important to provide a solution to those who are technologically challenged. If I do not have all the data, treatment will not be accurate enough, and I can't always sit down with each and every one*" (#1). Each patient population responded differently to the transition to remote care. "*Remote visits have a timesaving advantage among younger working patients, but with elderly patients, who do not know how to download a pump report to the computer, I could only talk and ask about glucose levels, which is not enough for providing proper care*" (#2 and #9). The DiNPs were required to modify the service to the patients' characteristics. "*We met some patients face-to-face, some on the telephone, and some through emails and text messages*" (#7). The DiNPs were flexible and made efforts to respond to any situation. "*My patients are elderly… They did not download a pump report… People measured their glucose levels while on the [phone] line with me, and although it was a phone call, we were able to figure out the problems.*" (#8). Despite the difficulties, the DiNPs did not give up and made an effort to help patients who demanded extra time. "*If they continued to have difficulties later on, I would continue to talk to them on video, instructing them how to inject and how to measure glucose.*" (#23). The re-examination of

the interventions raised the possibility of combining different approaches, breaking the boundaries of the pre-COVID-19 routine."*If we combine [face-to-face] meetings with an occasional digital clinic, it would help many patients who find it difficult to physically attend the clinic. We would be able to respond from home and not only during working hours*." (#23). Occasionally technological accessibility around the clock became a nuisance, invading unconventional hours: "*Patients and family members start corresponding with me on the weekend to make them appointments… start asking us other things*" (#5). This interviewee suggested: "*I would like [to have] an external phone number [that belongs to the organization] to give to patients*."

Initiative, resourcefulness, and problem solving

During the pandemic, the DiNPs showed creativity and skills that are not always reflected in routine clinical practice. Their answers demonstrate creative problem solving within the boundaries of authority, as well as initiative and resourcefulness when facing unconventional conditions. "*…I change the pump doses according to the information I receive, and also change the treatment, if necessary. In addition, I have an arrangement with the pharmacy: I send them the prescriptions so that the patient does not have to meet with me to collect them*" (#2). This interviewee linked the constraints of the situation to the need to be creative: *"Because we need to receive patients remotely, by phone or conference calls, it has developed our creativity*".

DiNPs gained confidence and initiated moves: *"In the past I would be called if there was a patient with [glucose] imbalance; now I go in on my own initiative and look for what needs to be changed. I call patients on my own initiative to guide them*" (#13). In some cases, DiNPs took calculated risks, such as visiting patients with severe diabetes and acute COVID-19, in order to complete assessments and provide optimal treatment. "*He was treated for suspected COVID-19 and the conduct in the wards was the same. I went in to visit him with protective equipment; he needed me more than a regular patient because the isolation is very difficult*" (#20).

Theme 4: Changed perception of DiNP roles

Autonomy and independence

While providing remote care, DiNPs provided independent and comprehensive individual responses to their patients without physician involvement, as well as guidance and treatment, making further medical consultation unnecessary. The interviewees felt that telemedicine enabled them to further realize their professional potential and utilize their clinical powers. "*My knowledge and experience, and the powers I received enabled me to recommend changes in the treatment without the need to consult a physician. I was much more independent and made more decisions. I did not need the physician's help*" (#9). The DiNPs' professional autonomy and exclusive presence in the field, together the need to streamline processes, encouraged a comprehensive approach. "*Today I provide a complete and holistic treatment, looking at all aspects*" (#22). This sense of independence and significance was accompanied by personal fulfillment and motivation. "*I felt my voice is heard far away, even by people I would not have dreamt would come to such counseling. It makes me feel good that I can give more to people*" (#6). The DiNPs' colleagues also recognized their autonomous conduct: "*The physician told me that during the COVID-19 pandemic I became independent*" (#21).

Control, proactivity and efficiency

The interviews raised an exceptional issue of efficiency, effectiveness, and targeted patient therapy. When asked about face-to-face meetings, DiNPs stated that they often had to provide services to several patients simultaneously, which led to anxiety and multitasking. The transition to telemedicine during the COVID-19 pandemic enabled them to provide targeted care to a single patient with no interruptions by other patients or additional tasks. The virtual session was perceived as more effective, allowing them to learn about their patients in advance, review their medical file and to start the remote session more prepared. This preparation enabled the DiNPs to focus on details and to build a personalized treatment plan. "*I got organized before and went into the patient's file and checked what was before - before I called him, I … prepared for the visit*" (#6).

Beyond this, the DiNPs were required to recommend technologies and make them accessible to patients. For example, to teach patients to install new apps on their smartphone, to download data from an insulin pump and sensor, and to encourage patients to download data before the session. This required the patient and the DiNP to prepare in advance. "*My contribution is in the preparation, in teaching the patients to use the software and download data… to ask things, to explain how to deal with the devices*" (#4). DiNPs who had to keep working in the clinic during the pandemic refined their unique role, delegated powers for performing basic tasks, and learned to enlist the help of dedicated staff members such as the organization's diabetes trustees: *"I would call the diabetes trustees, and they would change what they could, and for other issues - If had to give guidance or talk to the physicians*" (#3).

Theme 5: Cultural diversity and improving communication skills

Cultural and technological diversity among patients

The participants reported that dealing with cultural and technological diversity was challenging, especially among patients from three sectors: Arabs, ultra-orthodox Jews and Ethiopian immigrants. *"There are issues that cannot be solved over the phone, for example people with language problems or cultural barriers, especially immigrants of Ethiopian descent… they do not know Hebrew*" (#1). Interviewee #12 strengthened and expanded the groups at risk: "*There are populations that do not have access to telemedicine… such as the ultra-orthodox, the Arab sector, or the immigrants from Ethiopia. I would like to find a way to reach them*". The technological barrier highlighted the need to provide a tailored response to groups that have fallen outside the circle of accessible care. "*It meets a very important need, and I'm considering continuing doing this work in the future with patients who are unable*

to come for counseling… To make sure that everyone can have access to this consultation" (#13). Interviewee #6 addressed the challenges of caring for the Bedouin population (a nomadic population living in difficult desert areas of Israel): "*She [a Bedouin patient] could not download the glucose data, no matter how much I told her that I would help her… so I asked her to send me a screenshot and then we looked at her screen together*". The DiNPs expressed cultural sensitivity and knew how to provide technological solutions in accordance with the patients' level of control over the technology or their health literacy.

Improving communication skills with patients

During lockdowns, phone and video calls became the main communication channel with persons with diabetes. The DiNPs were required to develop and improve their skills for operating remote care platforms. One of the interviewees emphasized that the change was substantial and not just technical: "*There was a change in communication with patients… the relationship was through calls, messages, phone and emails. It was certainly different and placed the treatment relationship in a completely different place*" (#7). The online interventions improved DiNPs' counseling skills: "*I have improved my ability to separate the essential from the bland*." (#18). In some cases, remote interventions have so far succeeded in replacing physical visits. Some patients preferred continuing to receive remote treatment even after face-to-face meetings at the clinic was allowed again: "*Due to lockdown, there was a period of a month or so when everything was on the phone… communication was effective, and to this day there are patients who prefer telephone counselling*" (#8).

DISCUSSION

DiNPs have been at the forefront of dealing with the consequences of the COVID-19 pandemic among individuals with diabetes by providing care through telemedicine, which included phone calls, video calls, and text messages, as well as in clinics. The benefits of telemedicine reported by the participants are consistent with the literature (Nguyen et al., 2020), and include improved ambulatory care, greater accessibility to patients, particularly to those living in peripheral regions of the country, and the opportunity for multiprofessional meetings. The DiNPs reported improved control, efficiency, convenience, and satisfaction with this method, which promoted patient-centered care. The positive impact of telemedicine on the effectiveness of monitoring and controlling glucose and glycosylated hemoglobin (HbA1c) levels among individuals with diabetes was reported in the past (Ciemins et al., 2011; Kobe et al., 2020; Quinn et al., 2020; Rodríguez-Fortúnez et al., 2019; Rodriguez-Idigoras et al., 2009; Yaron et al., 2019). High patient satisfaction with the use of telemedicine was also reported (Ciemins et al., 2011; Rodríguez-Fortúnez et al., 2019). The COVID-19 pandemic has accelerated the implementation of telemedicine, and it is expected to be integrated into routine medical practice in hospitals and in the community (Tavori, 2020). Importantly, telemedicine may be a practical solution for providing optimal care to individuals with diabetes, especially to vulnerable populations and to those living in peripheral or rural regions with limited access to specialists and medical support (Ciemins et al., 2011). It is important to note that the successful implementation and use of telemedicine require advanced infrastructure (Hosten et al., 2021), technological capabilities, and commitment of caregivers and patients (Imlach et al., 2020; Rodríguez-Fortúnez et al., 2019).

Diabetes treatment involves multiple biological and psychosocial factors as well as instrumental skills (Caballero, 2018). Low technological literacy and language difficulties are major barriers to therapeutic processes. During the pandemic, patients with technological abilities enjoyed continuous care while those who had difficulties in operating remote technology found themselves outside the circle of care. The salient clinical disadvantages of telemedicine are related to the limitations of the implementation of practical operations. In this study, the DiNPs mainly reported an inability to complete clinical and physical assessments and to provide optimal guidance on technical aspects of using devices and injection techniques. The efficiency and convenience of virtual encounters were questioned due to technical and technological difficulties, such as disconnections during video calls, the inability to see patients' faces, and difficulties in understanding if patients understood health professionals' remotely conveyed instructions (Triana et al., 2020). This was especially prominent among several sectors of the Israeli population with language barriers and low digital literacy—Arabs, ultra-orthodox Jews, and Ethiopian immigrants. Elderly individuals, particularly those with cognitive decline, which is common among individuals with diabetes, may also find it difficult to use computers or access the Internet (Sy & Munshi, 2020). Additionally, DiNPs have also had to adjust to the use of the new communication platforms and acquire new skills. Flexibility and the ability to find solutions in unconventional situations was essential attribute for dealing with the challenges posed by the pandemic.

Although most interviewees used telemedicine for the first time during the pandemic, they were prepared and satisfied with this new approach, enabling its integration during the post-COVID-19 era (IMA, 2020). Notably, the Israeli Ministry of Health supported the expansion of remote services by technological means even before the COVID-19 outbreak (MOH, 2019), but the imposed restrictions and lockdowns promoted its fast implementation. Similarly, the NHS recommended using a combination of virtual clinics and telemedicine for diabetes care of patients during the COVID-19 pandemic (NHS, 2020).

Multidisciplinary approaches and teamwork are essential for the success of diabetes treatment and management (Prahalad et al., 2020). Teamwork has been shown to improve the efficiency and safety of treatment, prevent resource waste and duplication, and increase staff and patient satisfaction (Williams, 2016). During the pandemic, medical teams were under unprecedented stress. In such periods, teamwork is required (Singer et al., 2020), but constant pressure makes it significantly difficult to work in a coordinated manner. Analysis of the interviews conducted in the study reinforced this understanding. DiNPs reported mutual assistance

and support in clinics characterized by teamwork, whereas in clinics in which teamwork was unsuccessful, they reported difficulty in coordinating and managing treatment. It seems that one of the challenges of teamwork during the pandemic was related to coordination among the multi-professional team members who provided remote care. The team was required to streamline communication and the transfer of information to the patient and within the team. Teamwork also contributed to the mental support of the team members. Collaboration among team members seems to have helped in adapting to the new situation and improved the ability to provide a comprehensive response to patients. In this context, DiNPs had a vital role—both in providing quality care and in coordinating among team members to implement the treatment plan. The new communication patterns established during the pandemic may serve as a model for treatment management in the future.

Professional flexibility, problem solving in an unconventional way, and initiation of activities are a major part of the nurse practitioner's professionalism (Lowery et al., 2016). Because patients could not come to the clinic due to the COVID-19 restrictions, this period provided DiNPs with the opportunity to become more efficient and focused, and to clearly define their role within the organization. They took greater responsibility for the entire treatment process and realized their authority as clinical specialists. They had more time to work independently and to initiate activities and collaborations with physicians and other professionals. The DiNPs chose to use these skills at a time of uncertainty and lack of clear guidelines in order to provide professional services to at risk populations, while empathizing and maintaining human contact with patients. In this context, nurses have been regarded as the guardians of humanity, protecting the patient from the dehumanizing effects of technology (Rubeis, 2021). As seen in this study, the DiNPs worked to soften the negative effects of digital technology and demonstrated resourcefulness and initiative.

A search of the literature did not reveal any reports on role changes of DiNPs following the implementation of telehealth during the pandemic. However, such changes may be extrapolated from reports on other professions. A study that examined changes in clinical responsibility, treatment, and communication during the pandemic in nine pediatric diabetes clinics, showed that telemedicine created a challenge and an opportunity to improve the quality of care, and encouraged patients to self-manage their care and share data. Like the DiNPs in our study, the pandemic was also regarded as an opportunity to perfect roles. DiNPs were encouraged to adapt to the changing situations and to tailor approaches to fit their patients in order to optimize treatment (Sarteau et al., 2021).

STUDY LIMITATIONS

The limitations of the present study are inherent to qualitative research. The main limitation is the subjective nature of this research approach which provides the opinions of a relatively small number of interviewees. Nevertheless, qualitative studies provide a rich database for the studied issues, leaving transferability evaluations to the readers, while the validation techniques applied during the data analysis process, improve the accurate representation of the studied phenomena (Anderson, 2010; Lincoln & Guba, 1985). Moreover, the 24 DiNPs that were interviewed comprise 75% of registered DiNPs in Israel, therefore the analysis is expected to accurately present the situation in Israel. Finally, an interview may lead to a social desirability bias. As recommended by Shkedi (2011), this bias was minimized by avoiding judgmental expressions in response to the participants' answers and by maintaining the participants' identities confidential.

CLINICAL IMPLICATIONS

The implementation of telemedicine for diabetes management highlights the need for training DiNPs in skills required for remote intervention. In addition, there is a need to educate patients at risk to use telemedicine and understand related digital information. The assimilation of technologies with video may make telemedicine more accessible to therapists and patients and may improve some of the disadvantages mentioned in the interviews. The lessons learned during the COVID-19 pandemic provide an opportunity for using new remote approaches in diabetes management, in addition to the conventional face-to-face meetings. Further investigations may examine the contribution of hybrid models of care to treatment management by DiNPs.

CONCLUSIONS

The COVID-19 pandemic has posed new challenges. Along with the need to adapt the therapeutic approach to remote care, DiNPs improved their professional status, acquired new skills, and were satisfied with their professional growth. It seems that telemedicine will become an integral part of diabetes management, either with or without face-to-face clinic visits.

CLINICAL RESOURCES

- American Diabetes Association. How COVID-19 Impacts People with Diabetes. https://www.diabetes.org/coronavirus-covid-19/how-coronavirus-impacts-people-with-diabetes
- American Association of Nurse Practitioners. Diabetes Continuing Education: Equipping Nurse Practitioners to Help Improve the Health of Patients at High COVID-19 Risk. https://www.aanp.org/news-feed/diabetes-continuing-education-equipping-nurse-practitioners-to-help-improve-the-health-of-patients-at-high-covid-19-risk
- Medscape Nurses. Lessons from COVID-19 Need to Be Learned for Diabetes Care. https://www.medscape.com/viewarticle/940070

CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author [IK], upon reasonable request.

ETHICAL APPROVAL

The study was approved by ethics committee of Tel Aviv University, Israel (#0001717-1).

REPORTING GUIDELINES

COREQ Checklist was used.

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How to cite this article: Waizinger, O., Shpigelman, M., Shental, R., Yunis, B., Shimoni, P., Od Cohen, Y., & Kagan, I. (2021). Diabetes nurse practitioners in the shadow of the COVID-19 pandemic: Challenges, insights, and suggestions for improvement. *Journal of Nursing Scholarship*, 00, 1–9. https://doi.org/10.1111/jnu.12754

APPENDIX 1: Interview guide for collecting qualitative data

Below is an interview guide for conducting an in-depth personal interview with diabetes nurse practitioners who treated patients during the COVID pandemic.

Background characteristics

1. Medical organization 1) Health fund 2) Hospital
2. Workplace: 1) Inpatient wards 2) Community 3) Primary clinic in the community 4) Diabetes clinic/institute (ambulatory)
3. Seniority in treating individuals with diabetes (years) _____
4. Geographical area: 1) North 2) Center 3) South 4) Jerusalem and the surrounding area
5. Methods of contacting patients during the COVID pandemic (more than one option can be chosen): 1) Telephone consultation 2) Video calls 3) Face-to-face meeting 4) Other _____
6. Have you treated diabetes patients who also had COVID-19? 1) Yes 2) No
7. How would you define yourself on a continuum of human or technological inclination?

Interview guide for qualitative study

1. Describe the changes in your professional functioning during the COVID-19 pandemic
2. Describe, from your experience during the COVID-19 pandemic the advantages and disadvantages of providing remote counseling for the treatment of diabetes?
3. What was your contribution as a clinical specialist in diabetes during remote visits?
4. If there would be another outbreak, what will you do in a similar way and what would you do differently?
5. How has the COVID-19 pandemic affected working in a multiprofessional team?
6. If you treated diabetes patients who also had COVID-19 please describe the treatment characteristics and special emphases
7. How would you conclude the feelings and experiences of providing remote counseling?