

Research

Primary healthcare professionals' awareness of management guidelines for type-2 diabetes mellitus and erectile dysfunction in Indonesia: a focus group discussion during the COVID-19 pandemic

Setho Hadisuyatmana^{1,2} · Gulzar Malik³ · Ferry Efendi^{2,3} · Sonia Reisenhofer⁴ · James H. Boyd¹

Received: 13 January 2025 / Accepted: 15 April 2025

Published online: 28 April 2025

© The Author(s) 2025 **OPEN**

Abstract

Purpose Indonesia's national health system recognizes the interconnectedness of Type-2 diabetes mellitus (T2DM), erectile dysfunction (ED), and cardiovascular consequences; thus, it incorporates ED screening as a recommended practice within its national guidelines for T2DM management. However, a notable gap persists concerning the interpretation and application of the guidelines by healthcare professionals (HCPs) within public primary care settings. This study explored the HCPs' awareness of the Indonesia's national guidelines for T2DM management and its influence on their care provision for men with T2DM, particularly those at risk of developing ED.

Participants and method This qualitative study was influenced by Charmaz's constructivist grounded theory approach, focusing on selectively engaging non-communicable disease management teams from primary care centers in Surabaya, comprising general practitioners, nurses, and nutritionists. The data collection took place during the COVID-19 pandemic through online focus group discussions (FGDs) and was analyzed through open coding, focused coding, and category formation processes.

Findings Nineteen HCPs participated in four FGDs. The category "Engaging with T2DM guidelines" emerged, encompassing HCPs' understanding, adherence, and clinical implication of the recommended T2DM guidelines. A significant barrier identified was the HCPs' lack of familiarity with the national T2DM management guidelines, primarily due to their release during the COVID-19 pandemic. This hindered their ability to identify ED in patients. Additional challenges, such as demanding daily workloads, unequal distributions of healthcare personnel, and variations in qualifications, further restricted their capacity to stay updated with guidelines and recommended practices.

Conclusion This study identifies a notable lack of awareness among the HCPs regarding the current national guidelines for T2DM management, potentially resulting in inadequate support for addressing the specific needs of men affected by T2DM. Future studies should explore how enhancing HCPs' skills and knowledge can be effectively translated into the practical implementation of ED screening within T2DM management. Such insights could contribute to optimizing care delivery within Indonesia's evolving healthcare system.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1186/s12982-025-00590-x>.

✉ Setho Hadisuyatmana, s.hadisuyatmana@latrobe.edu.au; setho.h@fkip.unair.ac.id | ¹Department of Public Health, School of Psychology and Public Health, La Trobe University-Melbourne Campus, Kingsbury Drive, Melbourne, Victoria 3083, Australia. ²The Faculty of Nursing, Universitas Airlangga, Kampus C Universitas Airlangga, Jl. Mulyorejo, 60115 Surabaya, East Java, Indonesia. ³Department of Nursing, La Trobe University, Melbourne, Victoria, Australia. ⁴Bairnsdale Regional Health Service, Bairnsdale, Victoria, Australia.



Keywords Healthcare professionals · Type-2 diabetes mellitus · Non-communicable disease · Erectile dysfunction · Guideline implementation

1 Introduction

Diabetes mellitus is a global epidemic, affecting nearly 11% of the world's population, with Type-2 diabetes mellitus (T2DM) accounting for 90% of cases [1, 2]. T2DM is a chronic condition caused by insulin resistance or the incapability of the pancreas to produce insulin [3]. T2DM can lead to persistent hyperglycaemia, angiopathy and neuropathy, with multiple consequences, including but not limited to loss of vision, kidney disease, delayed wound healing, amputation, sexual dysfunctions and cardiovascular diseases such as heart failure, acute myocardial infarction or stroke [4, 5].

Data from the International Diabetes Federation (IDF) consistently shows an increasing global trend in T2DM prevalence, with the rise being pronounced in men [2]. In 2017, T2DM affected 8.9% of men worldwide [6]. Within four years, the IDF reported a continuing rise in the prevalence of T2DM, impacting 10.8% of men in 2021, with the highest growth observed in Southeast Asian, Middle Eastern, and North African countries [2, 7]. In Indonesia, 11.3% of the population, or over 19.5 million people, are affected by T2DM, with the rate of premature death rising from 356.05 per 100,000 in 2000 to 412.46 per 100,000 in 2019 [7–9]. In 2023, the Surabaya City Health Department reported that 104,363 individuals were diagnosed with T2DM, marking the highest prevalence in the province of East Java [10]. However, these figures may not capture the actual situation, as under-reporting and undiagnosed cases, mainly due to a tendency to avoid disclosing health complaints and accessing health services [11, 12].

One noteworthy complication in T2DM men is associated with erectile dysfunction (T2DMED), which often serves as a marker for cardiovascular disease (CVD) development. Unfortunately, T2DMED is frequently overlooked during health visits [5, 13, 14]. T2DMED may be present within the first year of developing T2DM, and the risk increases with disease progression [15]. Studies indicate that men with T2DMED have at least a 40% higher chance of developing CVD, which can lead to poor quality of life, shorter life expectancy, and premature death [13, 16–19]. In Indonesia, little data is available regarding the prevalence of ED in the T2DM population, although a previous study identified that 84.4% of men seeking care for T2DM at a *Puskesmas*¹ presented with ED [21].

Studies suggest that T2DMED can adversely impact men's psychological well-being, dismantle intimate relationships with sexual partners, and drive them to risky health-seeking behaviours [22, 23]. Early identification of ED in the T2DM population is crucial for implementing intensive T2DM management strategies, thereby reducing the risk of associated complications [24]. Multiple studies support this view by promoting ED screening in primary care services [25–27]. While others have highlighted that such practice was not always reported [13, 14, 22, 25].

Indonesia's national health system acknowledges the interconnectedness of T2DM, ED, and CVD. These health issues are addressed within the framework of the nation's healthcare policies [20, 28, 29]. The Ministry of Health's Decree Number HK.02.02/MENKES/514/2015 (KMK 514) and the Ministry of Health's Regulation Number 5 (PERMENKES 514) outline the standards of care for T2DM management in primary health settings, one of which, in *Puskesmas* [30]. These guidelines acknowledge the significance of T2DMED and promote ED screening for the T2DM population [31]. In a later decree issued in 2020, article HK.01.07/MENKES/603/2020 (later referred to as Decree 603), the Ministry of Health further refined its recommendation by incorporating the Bahasa Indonesia version of the International Index of Erectile Function-5 (IIEF-5) as ED screening tool, which has been validated and proven reliable [32]. However, there is currently a lack of empirical evidence to assess HCPs' understanding of and the feasibility of implementing these guidelines in practice. Thus, this study was undertaken to contribute to the existing literature by exploring HCPs' insights on the national guidelines for T2DM management, particularly in the context of providing care for men with T2DM and who are concerned about T2DMED.

¹ Puskesmas refers to Indonesia's community health centres run by the national government. In Indonesia's tiered health system, the Puskesmas are the forefront of health services located in each district of the nation and are staffed healthcare professionals and health administrations. World Health Organization, Primary health care systems (PRIMASYS): comprehensive case study from Indonesia. Geneva: World Health Organization, 2017.

2 Material and methods

2.1 Design

This study is a qualitative exploration influenced by grounded theory (GT) methodology. This approach is considered appropriate for generating an understanding of social phenomena, as it relies on data collected directly from individuals who are well-acquainted with the studied phenomena [33, 34]. The methodology offers a valuable framework for the study to delve into HCPs' engagement with T2DM management guidelines and the care provided to their male patients within Puskesmas [34].

The authors' prior expertise in health and familiarity with the studied phenomena made the bracketing technique, commonly used in classical GT methodologies, impractical [33, 35, 36]. Hence, Charmaz's constructivist GT (CGT) was employed as the primary methodological influence for the study. CGT explicitly acknowledges and integrates researchers' pre-existing knowledge and insights into the research process [37]. Figure 1 presents an overview of the approaches employed in determining the study design, participant selection, data collection, and data analysis.

2.2 Participants

Using a qualitative research perspective, the participants of this study were selected purposively. Eligibility criteria for the study participants were established based on the Republic of Indonesia's Ministry of Health Regulation Number 43 year 2016, Number 4 year 2019, and the Ministry of Health Decree Number HK. 0107/MENKES/603/2020. Consultations with a diverse group of health professionals (including nurses, internal medicine specialists, urologists, and general practitioners of *Puskesmas*, private practices, and health profession associations) and a male patient facilitate the identification of suitable participants. This process resulted in GPs, nurses, and nutritionists working in *Puskesmas* who directly interacted with T2DM patients as target participants. The final criteria included individuals with at least three years of working experience and involved in the *Puskesmas* non-communicable disease management team. No contact was made with them before the data collection process.

The participant recruitment process for this study faced challenges due to the COVID-19 pandemic and related restrictions from 2021 to 2022. Initially, sixty-three *Puskesmas* across Surabaya were grouped into five city suburbs: metropolitan/central, northern, southern, eastern, and western suburbs. Each suburb's *Puskesmas* were coded and randomly selected using randomizer.org, with two *Puskesmas* representing each suburb.

Following the randomization and upon receiving ethics approval and research permissions from the city's Department of Health, formal letters requesting participation were sent to the heads of the selected *Puskesmas*. Subsequently, the heads provided the WhatsApp® contact details of the HCPs. Study information and participant invitations were shared via this platform, facilitating the distribution of electronic informed consent forms. This recruitment process was conducted from November 10, 2021, to January 27, 2022.

2.3 Data collection

Focused Group Discussions (FGDs) were employed as the primary data collection method in this study. This method allowed us to gather insights from multiple participants simultaneously and provided the platform to generate a collective understanding of the studied topic through group dynamics [38–40]. Due to the challenges posed by the COVID-19 pandemic and associated restrictions during the data collection period, the FGDs were conducted by the first author in a video-enabled online environment. Each FGD session for this study lasted between 90 and 120 min, with each participant involved in only one session. In line with Charmaz's CGT approach, theoretical sampling was employed using the findings from the initial FGDs to guide subsequent data collection [36].

The first FGD involved seven HCPs from two *Puskesmas*, represented by GPs, nurses, and nutritionists. An interview guide was developed based on the World Health Organization's Innovative Care for Chronic Conditions framework [41]. Subsequent FGDs excluded nutritionists as their role was not directly involved in assessing, prescribing treatments, and managing T2DM patients. Due to the constraints imposed by the COVID-19 pandemic and local restrictions, subsequent FGDs were conducted online with a reduced number of participants. Subsequent FGDs

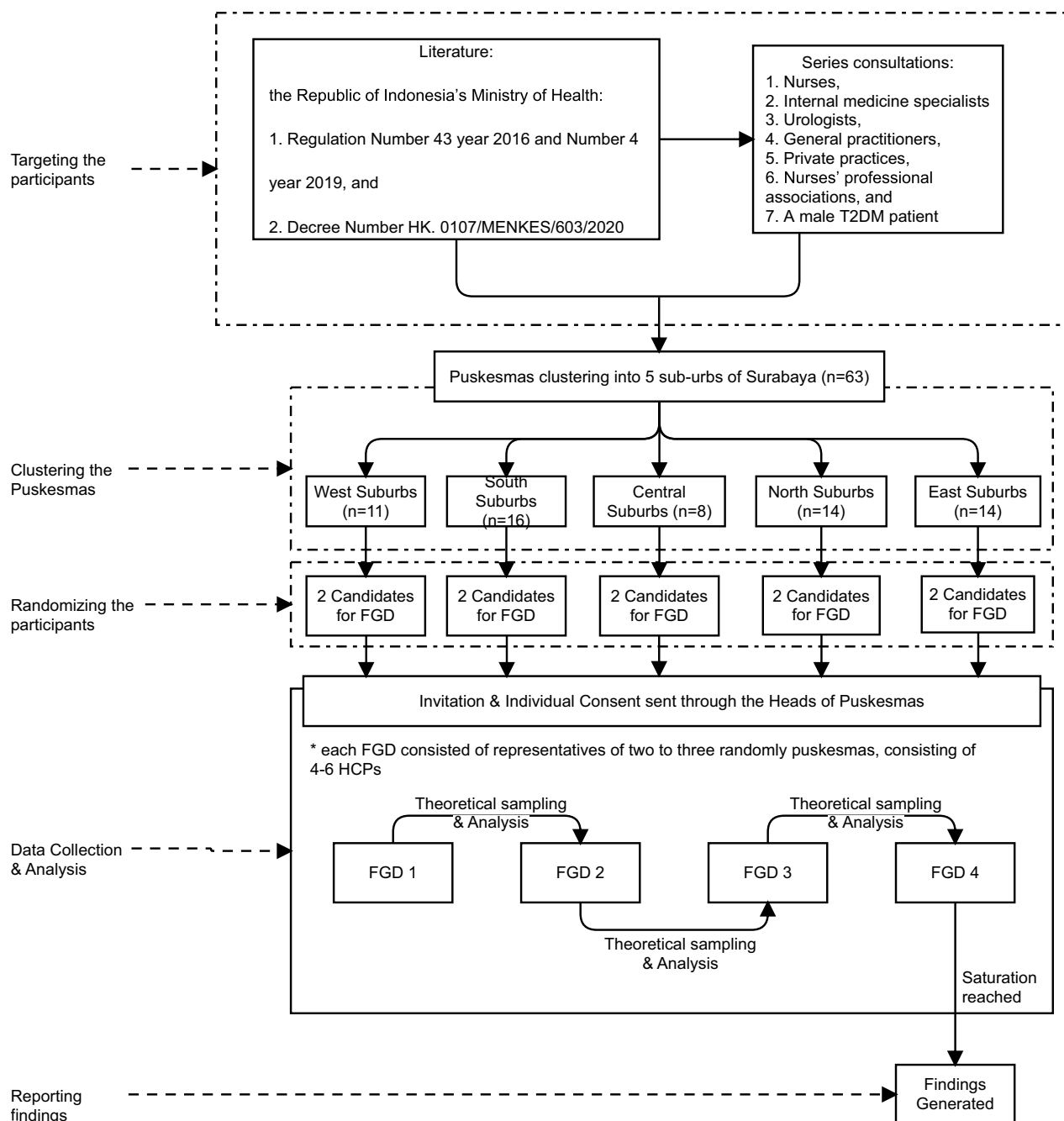


Fig. 1 Study workflow for design, participant selection, data collection, and analysis (here)

involved a doctor and a nurse from each of the two *Puskesmas*. The interview guide evolved based on findings from earlier FGDs, following the approach used in CGT. Notes were taken to record group dynamics, non-verbal expressions, and take-home messages. Audio records were detached from the video for transcription and analysis and then anonymised to maintain participants' confidentiality when presented as excerpts. These data collection processes were undertaken between December 2021 to June 2022.

2.4 Data analysis

The data were analysed by the first and second authors of this study following Charmaz's CGT methodology [42], consisting of (1) open coding, (2) focused coding, and (3) category formation using computer-assisted software,

including NVivo®, SimpleMind®, and Microsoft Excel®. Initially, open coding was performed by fracturing the verbatim data to generate numerous early codes. The fractured data were then read 'Line-by-line,' analysed, and compared with other incidents to identify patterns, similarities, and differences [36, 43]. The initial codes were then analysed to identify information gaps and to develop more pointed questions to guide subsequent FGDs [43]. This approach has facilitated the development of an initial understanding of the studied phenomena [36, 44].

The second step involved focused coding. Focused coding entailed the consolidation of ideas and the hierarchical organization of codes into initial categories based on shared properties and similarities [36, 43]. Memos were taken during the process to capture insights and thoughts about the data, facilitating the analysis of abstract relationships among the codes [35, 36, 43]. The fractured data were reconnected between and within categories. Simultaneously, an additional literature review was initiated to inform further questions in the following FGDs [45]. The existing and incoming data were constantly compared to refine the generated categories and sub-categories and to determine the need for additional data collection [35]. These simultaneous processes of data collection and analysis were completed after the fourth FGD, at which point category saturation was achieved, indicating that extra data would not yield new categorical information. The findings of this study are reported in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist (see Supplementary File 1) [46].

2.5 Rigour

This study's rigour is appraised based on the criteria of '*credibility*,' '*originality*,' '*resonance*,' and '*usefulness*.' '*Credibility*' entails ensuring a substantial pool of relevant data for formulating insightful questions, conducting systematic comparisons throughout the research process, and carrying out a thorough analysis [42]. This study involved pilot consultations to identify suitable participants and evolving questions throughout the FGDs. A constant comparative method was utilised throughout data collection and analysis, allowing for continuous refinement of the emerging category to ensure its '*credibility*'. The research team engaged in reflexive memo writing to recognise and mitigate the potential influence of our professional backgrounds on interpreting the data [36, 42].

The '*originality*' of this study is ensured by the novelty of its aim and questions formulated at the beginning of and during the data collection process [42]. The concept of '*resonance*' pertains to the researchers' capacity to elucidate the participants' experiences and communicate their insights to the readers [42]. Direct quotes from the participants were incorporated throughout the analysis to ensure that the identified themes accurately represented the participants' real-life experiences. These verbatim quotes were then integrated into the findings section to provide corroborative evidence for the identified sub-categories and a higher category. Lastly, the '*usefulness*' of this study is defined by its potential to bring attention to the phenomenon, establish a foundation for practical applications and policy development, pave the way for further research, and illuminate prevalent practices and processes [42].

2.6 Findings

2.6.1 Participants' demographics

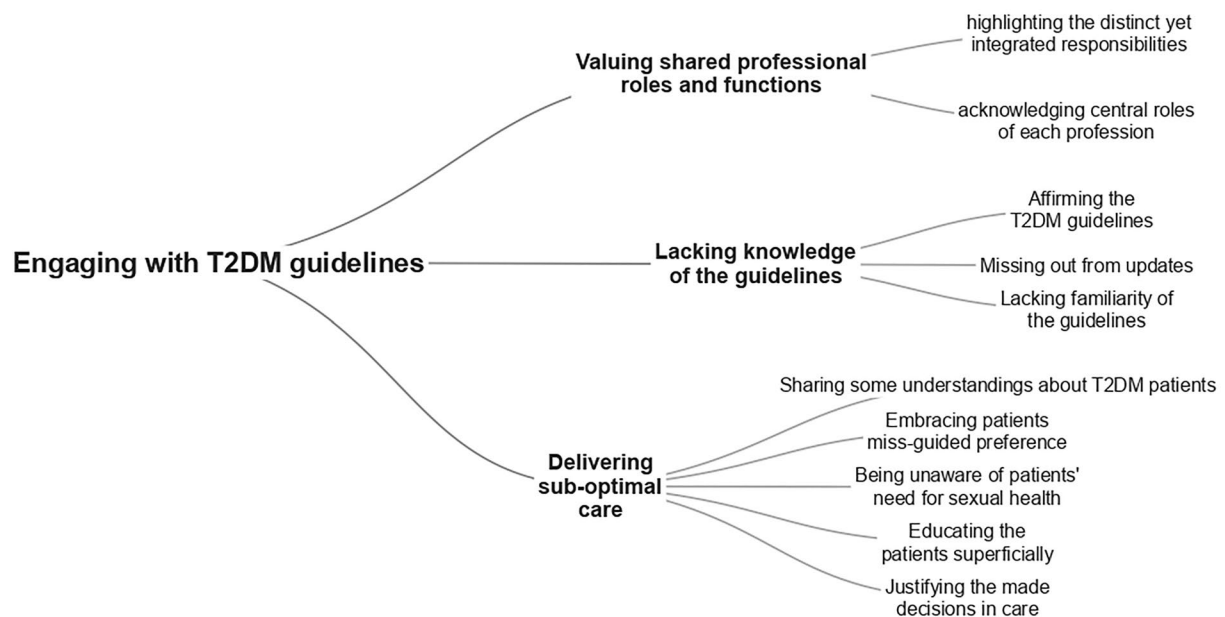
In total, 19 HCPs participated in the four FGDs, including nine general practitioners (GP), eight nurses, and two nutritionists. Most participating nurses and nutritionists graduated with a three-year diploma (D3). Demographically, most participants were women ($n = 12$, 63.16%) aged 31 to 54 years with working experience of at least five years ($n = 16$, 84.12%). However, their participation in the non-communicable disease management team ranged between three and 15 years (see Table 1).

2.6.2 The category: engaging with T2DM guidelines

The category: "Engaging with T2DM guidelines" emerged from the data, reflecting the HCP's level of understanding of national guidelines for T2DM management and its influence on their role in caring for patients with T2DM, including men with potential ED. The findings generated from this study suggest a lack of understanding displayed by some HCPs when explaining the recommended care for patients and the lack of awareness of the guidelines that could affect their care delivery. This category is conceptualised from three sub-categories: '*Valuing shared professional roles and functions*,' '*Lacking knowledge of the guidelines*,' and '*Delivering sub-optimal care*'. Figure 1 outlines the key concepts that emerged from each sub-category (see Fig. 1).

Table 1 Participants' demographics

	N
Gender	
Female	12
Male	7
Age (years)	
31–40	13
41–50	4
51–60	2
Position	
GPs (medical doctor)	9
Nurse	8
Nutritionist	2
Highest degree of education	
Three-year diploma (D3)	8
Bachelor or higher	11
Working experience (years)	
03-May	4
06-Oct	5
Nov-15	6
16–20	3
21–25	1
Working as non-communicable disease management team (years)	
03-May	12
06-Oct	5
Nov-15	2

**Fig. 2** The category and sub-categories gleaned from the participant's insights (here)

2.6.2.1 Valuing shared professional roles and functions The sub-category 'Valuing shared professional roles and functions' focuses on participants' awareness of their professional roles in providing care for patients with T2DM. Participants

discussed the routine care they deliver to patients suspected or diagnosed with T2DM, seeking consultation and management (Fig. 2).

In the FGD, the participants highlighted distinct yet interconnected responsibilities among various healthcare professions. It was unanimously agreed upon that nurses play a crucial role in conducting the initial assessment of patients visiting the healthcare facility. This assessment involves gathering information about the patient's current complaints, as well as their past and family medical histories specifically related to T2DM. By taking on this responsibility, nurses gather essential information that aids in understanding the patient's health status, potential risk factors, and any relevant familial connections to T2DM. This initial assessment helps in determining the appropriate course of action, such as further tests or consultations, and guides subsequent management and care as evidenced by a nurse participant excerpt:

We do the same stuff at all our workplaces. Every Puskesmas are practicing the same thing. Nurses handle the initial assessment and check-ups for patients who come in. They look at all the patients and do the first exam too. (NN, F3)
When we assess them, we ask if anyone in their family has a history of diabetes. Then we check if any family members have passed away because of diabetes complications. Their answers give us some clues. (NI, F1)

Following the initial assessment, the nurse would refer the patient to the doctor (i.e., general practitioner) for further evaluation to determine if additional examinations were required, as expressed by a GP participant:

...So, umm, after the nurse checks the patient, they'll need to see the doctor. The doctor will take another look at the patient and then decide what tests are needed for a more certain diagnosis. (DF, F3)

This practice was not only applied to new patients but also to returning patients who came with complaints or concerns associated with T2DM. In scenarios where the HCP suspected that the patients were affected by T2DM, the patients were then referred for a blood sugar level (BSL) test to confirm the diagnosis. As NI, a nurse recalled a routine encounter:

Only after that, as our doctor said earlier, we usually send them to get their blood glucose checked. That's the only to know if the blood sugar is high. (NI, F1)

This step was considered fundamental in clinical decision-making, such as prescribing therapies or referring patients to hospitals for comprehensive management.

From the result, if their blood glucose were high, by any chance, we would advise some therapy, give health education, and help them plan their diet. If the patients have more complicated issues or symptoms, we will refer them to the hospital. (DG, F1)

Nurses were responsible for organising home visits. The visits were designed to educate the patients and ensure their therapy adherence. This allowed them to evaluate the progress made by the patients and their families:

Nurses also organise home visits for diabetic patients, for example. We arrange the schedule for home visits to support and find out the progress made by patients and their families. (NY F4)

The findings highlighted the central roles of each profession in managing T2DM, with some aspects shared between doctors and nurses. Meanwhile, nutritionists' involvement in management was limited to diet modification. The FGD data suggests that doctors would consult, educate, and prescribe medication only after the patients were diagnosed with T2DM.

In general, the roles and responsibilities within the healthcare team were delineated, and each professional group contributed to different aspects of T2DM management. Doctors played a pivotal role in diagnosis, consultation, education, and prescription of medications, while nurses were crucial in the initial assessment and gathering of essential information. Nutritionists primarily focused on diet modification as part of the overall management plan. This division of responsibilities allowed for a comprehensive approach to T2DM care, leveraging the expertise of each healthcare professional.

At our Puskesmas, generally speaking, it's pretty much the same; the doctors usually the one talking with the patients after making a diagnosis. (NW, F3)

At a Puskesmas, it is usually the doctor who gives the therapy to the patients (DU F4)

Agreed! It is the doctor who prescribes the treatment, education and all that. (NN, F3)

This demographic distribution may have implications for the distribution of tasks and responsibilities within the healthcare team, as the FGD data indicated the central role of nurses in the initial assessment and gathering of essential information for patients with T2DM. In some participating *Puskesmas*, nurses outnumbered the doctors (i.e. general practitioners), with most of them female.

In our Puskesmas, we have nine nurses, but only one of them is a guy. Plus, out of the seven doctors, two are men. (NB, F2)

In my workplace, we have eight nurses and six doctors. (NY F4)

This extension of roles and functions for nurses, covering some tasks traditionally performed by general practitioners (GPs), reflects the need to utilise healthcare resources efficiently. In most cases, the nurses were involved in assisting with patient education.

...We were usually involved in educating patients about type 2 diabetes. (ND, F4)

In particular, the nurses took part in promoting patients' adherence to the treatment and emphasising the potential consequences of non-adherence behaviour:

Yeah, we encourage the patients to stick to their treatment and remind them that if they're not regularly managing their diabetes, they could get complications. (NI, F1)

A male nurse further outlined his involvement in assuring patients' adherence to medication and diet and in collaborating with the GPs for potential complications found during the outreach.

We make sure the patients know what medicines they need to take, whether they get them from the hospital or the Puskesmas. We also check on their diet and habits to help them meet their nutritional needs. That's what we are focusing on at the Puskesmas. And if we think there might be complications, we work together with the doctors at the Puskesmas. (NY F4)

A participating GP detailed that the nurses' involvement was not only offering care inside the *Puskesmas* setting but also reaching patients in the community. Therefore, she asserted that the nurses' roles were more than the GPs':

Because we have more nurses than GPs. So, they are more involved in reaching out to our patients, both in the Puskesmas and out in the community. Because of that, our colleagues of nurses take on more roles than we do. (DF, F3)

The role of nutritionists, on the other hand, is specific. They only consult and educate the patients about diet modification and planning. The findings suggested that nutritionists were doctors' delegates in modifying patients' diets.

We have a nutritionist here at the Puskesmas. We refer the patients to her for education and planning their diet. (DD, F3)

The nutritionists affirmed the doctor's statement by stressing that their role is to help the patients adjust their nutrition intake.

If we see someone with obesity or malnutrition, it is our job to help them either to lose or gain their weight. (AM, F1)

2.6.2.2 Lacking knowledge of the guidelines Most, if not all, participants referred to KMK 514 and PERMENKES 514 as the guidelines for managing T2DM in *Puskesmas*.

Yeah, we use KMK 514 as our guide for therapy guideline, I guess, and the Ministry of Health's Regulations concerning disease management. PERMENKES 514, if I'm not mistaken. (DD, F3)

A nurse affirmed that no other guideline was used to manage the patients presented with T2DM. Although the guidelines leaned towards a medical approach, they were shared among the HCPs to ensure uniformity of service in all *Puskesmas*. A nurse participant added that this was intended to avoid confusion around the care pathway that can lead to different approaches to treatment and intervention.

We don't have any other guidelines. We all follow the same one, KMK 514, so we're using the same approach for our patients. If we use different guidelines, we'd end up with different understandings and plans, just causing more problems. (NN, F3)

Aside from the guidelines, the participating GPs added the 2015 Indonesian Association of Endocrinologists (PERKENI) consensus book as a reference for managing T2DM patients. First issued in 1993, the book is annually updated with evidence-based T2DM management recommendations for service in Indonesia, citing updates from the American Diabetes Association, International Diabetes Forum, American Association of Clinical Endocrinologists, and National Institute of Health and Clinical Excellence [47]. The 2015 PERKENI book was cited in the national guidelines as the primary reference, and the 2019 revised version was substantiated as Decree 603. However, none of the participants were aware of this.

I don't know if there's a guideline launched in 2020 yet. (DRR, F4)

One of the participating doctors suggested that most *Puskesmas* use the 2015 version as the source to guide their service:

As for the medical guideline, as far as I know, I haven't updated myself on the latest one yet; I'm still using the one issued by PERKENI in 2015. (DN, F2)

The participating doctors reasoned that delays to updates were likely due to 2020's COVID-19 pandemic. They suggested they used to receive regular updates from the city Department of Health before the pandemic. The challenges caused by the pandemic included increased demands on HCPs in *Puskesmas* to deal with patients with COVID-19 and to undertake a mass vaccination program.

We're not using the new guidelines yet because we had to deal with the pandemic. So, we're still following the old SOP since we haven't received any directives, support, or updates from the health office. Even up to today, we're still busy working with things like the COVID-19 mass vaccinations. We're still drawn onto it now. (DL, F2)*

*SOP = standardised operational procedures.

Many HCPs claimed to be more familiar with the earlier guidelines (i.e., KMK 514 and PERMENKES 514) and the 2015 PERKENI book and argued that recommendations for physical exercise and diet modification were not mentioned.

When it comes to the guidelines, especially about how much exercise the patient should do, I don't think that that's covered. So, sorry, maybe one of the doctors here or someone else can help with that. I'm unfamiliar with the specific exercise details in the guidelines. (DEY, F1)

There is no such guidelines we use to educate the patients on diet or exercise, we don't have that. There is no specific guideline for prescribing exercise either. (DD, F3)

HCPs in *Puskesmas* may lack familiarity with the guidelines related to diet and physical exercise recommendations for patients with T2DM. These guidelines, including KMK 514, PERMENKES 514, and the 2015 PERKENI book, provide specific recommendations for managing T2DM through diet modification and exercise regimens. The potential lack of awareness or adherence by HCPs to these guidelines poses a risk of suboptimal care delivery, wherein crucial recommendations pertaining to diet and physical exercise may be inadvertently neglected.

In addition, guidelines provide ways to address the complications around T2DM, specifically erectile dysfunction (ED) in men. The guidelines suggest that HCPs should inquire about potential ED in men with T2DM, highlighting the importance of addressing this issue as part of comprehensive T2DM care. However, there was a lack of familiarity with the guidelines highlighting a potential gap in the care provided to male patients with T2DM, specifically their concerns regarding ED were unaddressed, one of the participants accentuated:

With regards to the erectile dysfunction, we frankly never thought about it. (DRR F4)

2.6.2.3 Delivering sub-optimal care Some participating professionals suggested that they primarily care for patients with T2DM with no complications, while others added that *Puskesmas* also treated those with complications. For instance, a GP stated:

At the Puskesmas, of course, we focus on what needs to be done for type 2 diabetes patients, mainly caring for those without complication. (DEY, F1)

A nurse added:

We treat patients with complications related to diabetes mellitus too, like wound care. (NI, F1)

Some participants consider complaints related to T2DM as a basis for additional assessment and clinical decision-making. In such cases, the HCPs would send the patients for laboratory analysis to confirm the diagnosis or determine the severity of the condition. Based on the results, the HCPs would then decide whether the patient needs a referral for further treatment, possibly to a hospital or specialised healthcare facility, as a GP exemplified:

If a patient comes in with complaints other than diabetes, like back pain or trouble urinating, we will send them for lab tests. If the results don't look good, we would refer them to the hospital. (DG, F1)

However, DG added that there were times when some patients refused referrals and insisted on relying upon the care they received from the *Puskesmas*. The HCPs had to respect the patient's preferences, regardless.

*Sometimes people are sick but choose not to be referred to a hospital, and we can't force them. So yeah, we would take care of them at the *Puskesmas*. (DG, F1)*

Concerning T2DMED, most HCPs indicated that they had not encountered any patients seeking assistance related to ED. The participants had also never raised T2DMED with their patients. As commented by some of the nurses:

Based on my personal experience, they never asked us about ED. (DD, F3)

Personally, no patient has ever come to me for erectile dysfunction, and we've never asked them about it either. (NN, F3)

As a result, these participants were unsure if their male patients were affected by T2DMED.

I'm not really sure, but honestly, we never really know if any of the patients have ED. (NI, F1)

A few participants recalled that they had very few patients asking for help relating to ED.

*In all the years I've worked at the *Puskesmas*, only once I met a patient asked about erectile dysfunction. He was the only one who brought it up. (DU, F4)*

Indeed, we've had few patients, but very few, ask why they can't get an erection. To me, it seems like they don't realise that diabetes is causing the issue. (NN, F2)

As a response, the GPs referred the patient to the hospital for further treatment.

*I sent the patient to the hospital for more treatments since we don't have the medication available at the *Puskesmas*. (DL, F3)*
So yeah, it looks like the complications have progressed too far for us to help. So, we suggested him to see a specialist at the hospital. (DU, F4)

On the other hand, a nurse assisted the patient by explaining the cause of T2DMED and how to prevent the problem from worsening.

I explained to him his problem was one of the complications of diabetes. We educated him on getting his blood pressure as normal as possible and making his lifestyle healthier to prevent his ED from getting worse. (NN, F2)

When further probed about the provision of educational advice to prevent ED progression, participants exhibited significant pause and silence, suggesting uncertainty and hesitation. A sense of doubt and hesitancy was evident among participants when responding to the query. Eventually, a nurse commented:

We advised them to be active and move around, for example, taking exercise for at least 30 minutes a day, three to four times a week if they can. But we also have to take into account their age and physical condition. (NY F4)

A female GP elaborated on the nurse's response by suggesting a more specific physical exercise regimen, emphasizing that it should involve more strenuous activities than merely maintaining movement or walking. However, she noted that adherence to the prescribed exercise regimen is unlikely among patients.

Isn't it supposed to be 150 minutes of exercise a week? That should be more intense than just moving around or walking to help as much. There should be a load test first, but let's not get it too deep into that. Even if we recommend brisk walking as the simplest one, they still won't do that. (DRR F4)

Participants indicated that patient non-adherence to exercise recommendations was a justification for prioritizing pharmacological interventions over lifestyle modifications.

These days, most people aren't that interested in eating healthier or exercising. So, I can't really prescribe them a strict diet plan. It's too tough to keep them in track anyway. In the end, we just end up prescribing them with medicines.(DEL, F1)

These findings indicate that some HCPs lacked the confidence to effectively advise patients on lifestyle and health improvements that could potentially restore erectile function. Meanwhile, others deliberately omitted education on the benefits of a healthy diet and exercise for diabetics. This suggests that some T2DM patients in *Puskesmas* may have received sub-optimal care.

3 Discussion

This study offers valuable insights into the implementation of national guidelines by HCPs in Surabaya's *Puskesmas*, with a particular focus on male patient care. The motivation behind this research stems from a previous review that identified a lack of HCP participation in studies exploring T2DM management and barriers to care for T2DMED in primary care settings globally [48]. Therefore, this study aimed to address this knowledge gap by investigating these aspects within the Indonesian context, particularly involving HCPs from *Puskesmas* engaged in non-communicable disease management.

The findings of this study shed light on how roles and responsibilities are shared among the HCPs in providing care for T2DM patients in *Puskesmas*. It provides insights into collaboration among different healthcare professions involved in T2DM management. Additionally, the study delves into the understanding and implementation of national guidelines for T2DM management by HCPs in primary care settings. It explores how their comprehension influenced the care provided for male patients who might have been affected by T2DMED. This is crucial for ensuring consistent and evidence-based care for male T2DM patients in primary care settings.

The findings of this study highlight the various roles played by different HCPs involved in care delivery. Nurses and GPs share responsibilities in assessing, diagnosing, prescribing treatment, delivering care, and educating patients, each with specific expertise and responsibilities. While the GPs are central in diagnosing T2DM, consulting with patients, and prescribing medical therapies, nurses are positioned at the frontline and play a critical role in receiving patients and undertaking the initial assessment. GPs possess the expertise in identifying T2DM based on the patient's symptoms, medical history, and diagnostic tests and play a crucial role in prescribing appropriate medications and treatment plans for patients with T2DM.

However, when addressing T2DMED, GPs were less likely to tackle potentially hidden issues. This finding lends support to previous studies conducted in Malaysia and South Africa, reporting that many GPs lack confidence in discussing erectile dysfunction with their patients, potentially due to a lack of skills and knowledge to screen and manage ED [49, 50]. While previous studies primarily examined GP practices in general populations, this study offers a novel perspective by focusing on ED in T2DM patients within the Indonesian healthcare context. This focus is important considering the higher risk of cardiovascular complications associated with T2DM and ED [19, 51, 52].

At the frontline, nurses play a critical role in patient reception and initial assessments. They gather essential information about patients' current complaints, medical history, and family history related to T2DM. This initial assessment is foundational for understanding patients' health status, risk factors, and familial connections to T2DM. However, the findings suggest that most, if not all, nurses did not include ED as part of their patient screening.

The study revealed that nurses' responsibilities extend beyond the initial assessment, encompassing the provision of treatment and outreach efforts to promote treatment adherence, including home visits. This expanded role is not unique to the participants; similar trends have been reported in other contexts, such as the United States [53]. The expansion of the nurses' role is often attributed to an imbalance between supply and demand, where GPs are outnumbered and a growing need for healthcare access [53]. In contrast, nutritionists typically remain focused on their role as patient diet consultants, providing dietary modification guidance as GPs prescribe.

Role sharing in *Puskesmas* is a response to the significant burden of chronic diseases, like T2DM, and the challenges associated with resource distribution within Indonesia's health system [20]. This approach is essential to meet the increased demand for HCPs to manage health issues more effectively. The 2016 national data reveals that approximately 25.57% of the nation's *Puskesmas* faced a shortage of GPs [20]. In contrast, nurses are available, with a nurse-to-population ratio of 96.2 per 100,000 population, surpassing the international reference ratio of 20 nurses per 100,000 population [20, 54]. This highlights the potential of expanding the role of nurses in enhancing health services capacity, taking on additional responsibilities to address the shortage of GPs in *Puskesmas*, and ensuring accessible care for a large number of patients, including those concerned with T2DMED. However, it is essential to note that most nurses in Indonesia

graduate with the completion of a three-year diploma program [55]. This educational background emphasises the need to effectively utilise the skills and competencies of nurses within the primary care setting, considering their education profile and the available resources in the healthcare system.

While role sharing can improve people's access to health services, it may also present challenges, such as potential role confusion and unclear accountability [53, 56]. This highlights the importance of addressing these challenges by establishing clear guidelines, protocols, and communication channels within healthcare systems. Such measures facilitate effective collaboration and coordination among the various professionals involved in T2DM management, ensuring that patients receive comprehensive and well-coordinated care.

The findings of this study further highlight the limited awareness of HCPs with the national guidelines for T2DM management, particularly with the latest guidelines (i.e., Decree 603) issued in mid-2020, which include the Bahasa Indonesia version of IIEF-5. The COVID-19 pandemic has had a significant impact on the nation's healthcare systems, overwhelming the capacity of health staff both physically and emotionally and exacerbating health issues and mortality [57]. The pandemic has posed substantial challenges and strains on the healthcare workforce and infrastructure, diverting attention and resources from routine healthcare services, including T2DM management.

During the study, the national health policy was temporarily redirected to address the COVID-19 pandemic. In the context of *Puskesmas*, health services primarily focused on managing mass vaccination and limiting non-emergency health visits [58]. This redirection likely influenced the HCPs' engagement with T2DM management guidelines, as their attention and resources were predominantly directed towards pandemic response and vaccination initiatives, disrupting HCPs' focus on implementing recommended practices. This highlights the temporary challenges healthcare systems face when the HCPs are expected to address the immediate and pressing healthcare needs.

Despite the claimed awareness of older versions of T2DM management guidelines, many participants chose not to suggest diet and physical exercise for their patients, although these measures are effective in helping those concerned with T2DMED [59]. Participants cited prescribing dietary changes and physical activities as impractical, resulting in patients' non-adherence. Regarding T2DMED, most participants admitted that they did not give enough attention to their patient's sexual health concerns. The findings further indicate that most, if not all, participants were not aware that ED screening in T2DM population is part of the recommended practice in T2DM management guidelines [30, 31]. This lack of awareness contributes to gaps in guideline adherence and patient care.

This study confirms the role of *Puskesmas* as the first point of contact for healthcare, with patients experiencing more complex or severe non-emergency issues eligible for appropriate referrals to hospitals for comprehensive management [60]. However, there are situations where HCPs may temporarily manage complications until patient's preferences can be accommodated or resolved [20]. Some instances found in the present study highlight situations when HCPs at *Puskesmas* are required to manage complications in patients who rejected referrals for various reasons. In such cases, HCPs must respect the patients' decisions and provide the best possible care within the limitations. Nonetheless, it is important to note that these findings are context-specific and may not necessarily generalise to *Puskesmas* of other regions in Indonesia.

With regard to T2DMED, this study reveals a discrepancy in the participants' observations, as most stated that their patients did not openly express concerns about their sexual problems. This contrasts with earlier studies that suggest patients with T2DMED do seek help for their condition, emphasising the importance of addressing this issue [22, 61–63]. However, a few participants reported instances where patients raised concerns about T2DMED. These participants were able to respond appropriately by referring the patients to hospitals for further management and promoting adherence to T2DM management. This suggests that some HCPs were proficient in addressing T2DMED when it was brought to their attention.

The limited familiarity of HCPs with the need for ED screening in T2DM population contributes to the neglect of patients' sexual health concerns and further general well-being. Consequently, the suboptimal care for T2DMED persists as an unmet need, indicating a discrepancy between the care provided and the expected standard of care [64]. Therefore, future efforts should focus on promoting HCPs' comprehension of T2DM management guidelines and awareness of the associated ED in men as patients. Improving HCPs' understanding of T2DM guidelines is expected to enhance the quality of care for individuals with T2DM and ED, ensuring that this vital aspect of men's health is adequately addressed. Not only is addressing T2DMED in health visits important for men's sexual health but further to mitigate its potential consequences for their overall health and well-being [19, 22, 23, 51, 52].

4 Conclusion

The findings in this study provide valuable insights into the care provided to T2DM patients with potential concerns regarding ED within the primary care services in Surabaya. This study highlights a notable lack of awareness among the HCPs regarding the current national guidelines for T2DM management, particularly in addressing the needs of men affected by T2DM-associated ED.

Furthermore, the findings suggest opportunities for improving T2DM management within *Puskesmas*. The HCPs are in need of knowledge and skills improvement to effectively address the concerns of male T2DM patients experiencing or at risk of ED. Strengthening their capacity could improve patient health outcomes while aligning with the demands of T2DM and associated ED in resource-constrained healthcare systems like Indonesia.

However, it is essential to acknowledge a research gap regarding how improved knowledge among HCPs can be effectively translated into the practical implementation of ED screening practices within the management of T2DM patients.

4.1 Strengths and limitations

The findings of this study should be interpreted within the scope of qualitative research, which inherently limits generalizability. The conclusions are applicable only to the participants and the specific context in which the study was conducted. Additionally, the absence of a triangulation process may affect the robustness of the findings. Furthermore, the depth of argumentation may be constrained by the relatively small number of participants in each focus group discussion (FGD). However, this decision was made deliberately and is justified by its alignment with similar studies conducted in comparable settings. In addition, the transferability of this study's findings was limited by the unique characteristics of the participants, particularly to medical generalists and other health professionals at similar levels. The novel of this study lies in its pioneering approach, being the first to incorporate HCPs as participants in the Indonesian context. It delves into their understanding and engagement with the national guidelines for T2DM management in primary care.

Acknowledgements We thank the Directorate General of Higher Education, Research and Technology of the Ministry of Culture Education, Research and Technology of the Republic of Indonesia. We appreciate the support from La Trobe University, Australia, the Universitas Airlangga, Indonesia, research assistants, key persons, and all participants.

Author contributions The authors' contributions to the present manuscript conform with the Australian Code for the Responsible Conduct of Research, the International Committee of Medical Journal Editors (ICMJE) and the CRediT authorship contribution statement. SH led the study and conceptualisation, methodology, investigation, data curation, analysis, and writing and editing of the draft manuscript. GM participated in conceptualisation, methodology, formal analysis, validation, review and editing of the draft, and supervision. SR contributed to the study conceptualisation, analysis, review, and supervision. FE participated in visualisation, supervision, and approval. JB led the drafting of the manuscript, contributed to the review and editing of the draft, and supervised the study.

Funding The study presented in this paper was part of a larger research project of the corresponding author related to his PhD study sponsored by the Directorate General of Higher Education, Research and Technology of the Ministry of Culture Education, Research and Technology of the Republic of Indonesia. The conduct of this study was supported by La Trobe University, Australia and the Universitas Airlangga, Indonesia. The sponsors and supporters were not involved in any conceptualisation, design, data collection, analysis, decision to publish, or preparation of this article.

Data availability The datasets generated and/or analysed during this study are not publicly available due to their sensitive nature and the high risk of re-identification but are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate This study was ethically approved by the Human Research Ethics Committee at La Trobe University of Australia (HEC21241) and the Health Research Ethics Committee at The Universitas Airlangga in Indonesia (2372-KEPK). The permissions to involve health professionals as participants were approved by the city council of Surabaya (070/25/Q/RPM/436.7.17/2021, 070/261/S/RPM/436.7.15/2022) and the city department of health (072/35305/436.7.2/2021, 072/3237/436.7.2/2022). All participants were contacted and provided with digital copies of information about the study and consent forms before FGD. Individual consent was obtained from each participant, ensuring the HCPs voluntary participation. Pseudonyms were then used in data analysis to preserve confidentiality and respect their rights and privacy.

Competing interests The authors declare no competing interests.

Open Access This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

References

1. Yu M, et al. Measuring the global, regional, and national burden of type 2 diabetes and the attributable risk factors in all 194 countries. *J Diabetes*. 2021;13(8):613–39.
2. Sun H, et al. IDF Diabetes Atlas: global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. *Diabetes Res Clin Pract*. 2022;183:109119.
3. World Health Organization, Global report on diabetes. 2016: World Health Organization.
4. Cho NH, et al. IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. *Diabetes Res Clin Pract*. 2018;138:271–81.
5. Owiredun W, et al. Sexual dysfunction among diabetics and its impact on the SQoL of their partners. *Int J Impot Res*. 2017;29(6):250.
6. International Diabetes Federation. IDF Diabetes Atlas. 2018 [cited 2018 20 July 2018]; Available from: <http://diabetesatlas.org/resources/2017-atlas.html>.
7. International Diabetes Federation, International Diabetes Atlas 10th edition, in IDF Diabetes Atlas, 10th edn. 2021, International Diabetes Federation: Brussels, Belgium.
8. Badan Kebijakan Pembangunan Kesehatan, Laporan SKI dalam Angka 2023, B.K.P. Kesehatan, Editor. 2023, Kementerian Kesehatan Republik Indonesia: Jakarta.
9. Harmadha WSP, et al. Explaining the increase of incidence and mortality from cardiovascular disease in Indonesia: A global burden of disease study analysis (2000–2019). *PLoS ONE*. 2023;18(12):e0294128.
10. Dinas Kesehatan Provinsi Jawa Timur, Profil Kesehatan Provinsi Jawa Timur 2023. 2024, Dinas Kesehatan Provinsi Jawa Timur: Surabaya. p. 378.
11. Crimmins EM, et al. Differences between men and women in mortality and the health dimensions of the morbidity process. *Clin Chem*. 2019;65(1):135–45.
12. Tanoey J, Becher H. Diabetes prevalence and risk factors of early-onset adult diabetes: results from the Indonesian family life survey. *Glob Health Action*. 2021;14(1):2001144.
13. Bebb R, et al. Sexual dysfunction and hypogonadism in men with diabetes. *Can J Diabetes*. 2018;42:S228–33.
14. Tisdall RA, et al. Erectile dysfunction: they don't talk, we don't ask. *Diabet Med*. 2018;35(5):667–8.
15. Kouidrat Y, et al. High prevalence of erectile dysfunction in diabetes: a systematic review and meta-analysis of 145 studies. *Diabet Med*. 2017;34(9):1185–92.
16. Abdelhamed A, et al. Relation between erectile dysfunction and silent myocardial ischemia in diabetic patients: a multidetector computed tomographic coronary angiographic study. *Sex Med*. 2016;4(3):E127–34.
17. Abdulhadi MH, et al. Erectile dysfunction and type 2 diabetes mellitus: a new twist. *Int J Nutr Pharmacol Neurol Dis*. 2020;10(2):43–9.
18. Al Turki YA. Should an inquiry about sexual health, as a reflection of vascular health, be part of routine physicals for young men? Results from an outpatient study. *Int J Impot Res*. 2009;21(6):362–5.
19. Araujo AB, et al. Endogenous testosterone and mortality in men: a systematic review and meta-analysis. *J Clin Endocrinol Metab*. 2011;96(10):3007–19.
20. World Health Organization. Primary health care systems (PRIMASYS): comprehensive case study from Indonesia. Geneva: World Health Organization; 2017.
21. Tridiantari DK, Saraswati LD, Udiyono A. Epidemiology of erectile dysfunction in men with diabetes mellitus: a study in a primary health care center in Indonesia. *Med J Indonesia*. 2020;29(1):82–7.
22. Hadisuyatmana, S., et al., The Experience of Indonesian Men Living with Type-2 Diabetes Mellitus and Erectile Dysfunction: A Semi-structured Interview Study. *Sexuality and Disability*, 2021.
23. Thongtang P, et al. My thing is dead: experience of dealing with diabetic erectile dysfunction of Northern Thai Men. *Pacific RIM Int J Nurs Res*. 2021;25(2):255–68.
24. Diaconu CC, et al. The erectile dysfunction as a marker of cardiovascular disease: a review. *Acta Cardiol*. 2020;75(4):286–92.
25. Heiden-Rootes KM, et al. Sexual dysfunction in primary care: an exploratory descriptive analysis of medical record diagnoses. *J Sex Med*. 2017;14(11):1318–26.
26. Bijlsma-Rutte A, et al. Screening for sexual dissatisfaction among people with type 2 diabetes in primary care. *J Diabetes Complic*. 2017;31(11):1614–9.
27. Al-Sharefi A, et al. How to manage low testosterone level in men: A guide for primary care. *Br J Gen Pract*. 2020;70(696):364–5.
28. Ministry of Health Republic of Indonesia, Peraturan Menteri Kesehatan Republik Indonesia Nomor: 43 Tahun 2019 tentang Pusat Kesehatan Masyarakat, M.o.H.R.o. Indonesia, Editor. 2019: Jakarta.
29. Sari EF, Mukhbitin F, Ernawaty E. Kemampuan Klinik Pratama dalam Menangani 195 Diagnosis di Kota Surabaya. *Buletin Penelitian Sistem Kesehatan*. 2021;24(1):11–9.

30. Ministry of Health Republic of Indonesia, Keputusan Menteri Kesehatan Republik Indonesia Nomor HK.02.02/MENKES/514/2015 tentang Panduan Praktik Klinis bagi Dokter di Fasilitas Pelayanan Kesehatan Tingkat Pratama, in 514, M.o.H.R.o. Indonesia, Editor. 2015: Jakarta.
31. Ministry of Health Republic of Indonesia, Keputusan Menteri Kesehatan Republik Indonesia Nomor HK.0107/MENKES/603/2020 tentang Pedoman Nasional Pelayanan Kedokteran Tata Laksana Diabetes Mellitus Tipe 2 Dewasa, M.o.H.R.o. Indonesia, Editor. 2020: Jakarta.
32. Laksita TB, et al. Translation validity and reliability of the Indonesian version of the 5-item International Index of Erectile Function (IIEF-5). *Turk J Urol*. 2021;47(6):489.
33. Charmaz K. *Constructing grounded theory*. London: Sage; 2014.
34. Redmond, M., *Symbolic interactionism*. 2015.
35. Birks M, Mills J. *Grounded theory: a practical guide*. London: Sage; 2015.
36. Chun Tie, Y., M. Birks, and K. Francis, *Grounded theory research: A design framework for novice researchers*. SAGE Open medicine, 2019. 7, 2050312118822927.
37. Charmaz K. Shifting the grounds: Constructivist grounded theory methods. In: *Developing grounded theory*. Routledge; 2016. p. 127–93.
38. Krueger RA. *Focus groups: a practical guide for applied research*. London: Sage publications; 2014.
39. Krueger, R. and M. Casey, *Focus groups*. 2000, Thousand Oaks: Sage
40. McKenna L, Copnell B. *Fundamentals of nursing and midwifery research: a practical guide for evidence-based practice*. England: Routledge; 2020.
41. World Health Organization. *Innovative care for chronic conditions: building blocks for actions*. Geneva: World Health Organization; 2002.
42. Charmaz K. *Constructing grounded theory: a practical guide through qualitative analysis*. London: Sage; 2006.
43. Charmaz, K., *Grounded theory: Main characteristics*. *Qualitative Analysis: Eight Approaches for the Social Sciences*. London: Sage, 2020, p. 195–222.
44. McCann, T.V. and E. Clark, *Grounded theory in nursing research: Part 1–Methodology*. 2003.
45. Corbin J, Strauss A. *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks: Sage publications; 2014.
46. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. 2007;19(6):349–57.
47. *Perkumpulan Endokrinologi Indonesia, Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 di Indonesia*. Pb. Perkeni, 2021.
48. Hadisuyatmana S, et al. The experiences and barriers in addressing type 2 diabetes mellitus-associated erectile dysfunction: a mixed method systematic review. *Syst Rev*. 2023;12(1):138.
49. Pretorius D, Mlambo MG, Couper ID. “We are not truly friendly faces”: primary health care doctors’ reflections on sexual history taking in North West Province. *Sexual Medicine*. 2022;10(6):100565.
50. Tay C, et al. Knowledge, attitude, confidence, and barriers in the practice of erectile dysfunction screening among primary health-care providers in Taiping Perak. *Malays Urol Sci*. 2019;30(4):170–6.
51. Artom N, Pinna G. The erectile dysfunction as a cardiovascular risk factor. *Italian J Med*. 2014;8(4):210–20.
52. Ma SW, et al. Effect of Panax ginseng supplementation on biomarkers of glucose tolerance, antioxidant status and oxidative stress in type 2 diabetic subjects: results of a placebo-controlled human intervention trial. *Diabetes Obes Metab*. 2008;10(11):1125–7.
53. Xue Y, Smith JA, Spetz J. Primary care nurse practitioners and physicians in low-income and rural areas, 2010–2016. *JAMA*. 2019;321(1):102–5.
54. Efendi F, Chen C-M, Kurniati A. The situational analysis of nursing education and workforce in Indonesia. *Malays J Nurs*. 2018;9(4):20–9.
55. McKenna L, et al. Professional development needs of registered nurses in Indonesia: a cross-sectional study. *Nurse Educ Today*. 2022;119:105543.
56. Rushforth B, et al. Barriers to effective management of type 2 diabetes in primary care: qualitative systematic review. *Br J Gen Pract*. 2016;66(643):e114–27.
57. Mahendradhata, Y., et al., *The Republic of Indonesia health system review*. 2017.
58. Rhatomy S, Prasetyo TE. Impact of COVID-19 on primary care visits: lesson learnt from the early pandemic period. *J Commun Empower Health*. 2020;3(2):102.
59. Hadisuyatmana S, et al. Non-medical and non-invasive interventions for erectile dysfunction in men with type 2 diabetes mellitus: a scoping review. *Heliyon*. 2023;9(5):e15778.
60. Ministry of Health Republic of Indonesia, Keputusan Menteri Kesehatan Republik Indonesia Nomor 128/MENKES/SK/II/2004 tentang Kebijakan Dasar Pusat Kesehatan Masyarakat, in 128, M.o.H.R.o. Indonesia, Editor. 2004: Jakarta.
61. Rutte A, et al. Type 2 diabetes patients’ needs and preferences for care concerning sexual problems: a cross-sectional survey and qualitative interviews. *J Sex Marital Ther*. 2016;42(4):324–37.
62. Cooper S, et al. “My wife’s mistrust. That’s the saddest part of being a diabetic”: a qualitative study of sexual well-being in men with type 2 diabetes in sub-Saharan Africa. *PLoS ONE*. 2018;13(9):e0202413.
63. Jiann BP, et al. Patterns and their correlates of seeking treatment for erectile dysfunction in type 2 diabetic patients. *J Sex Med*. 2009;6(7):2008–16.
64. Barnard-Kelly K, et al. Diabetes and male sexual health: an unmet challenge. *Pract Diabetes*. 2019;36(6):201–6.