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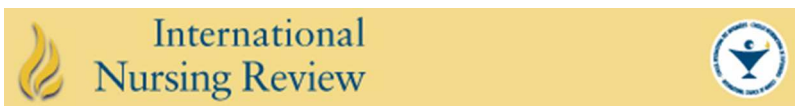
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**The profile of diabetes healthcare professionals in
Indonesia: A scoping review**

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ABSTRACT

Aim: To explore and synthesise evidence of the literature about healthcare professionals involved in the provision of diabetes management within an Indonesian context.

Background: Indonesia is challenged to control the major burden of diabetes prevalence rate that requires a multidimensional approach with the aim to optimise existing health services by involving healthcare professionals who can promote access and provide diabetes management.

Methods: This literature review, which is integrated with a scoping study framework, used the electronic databases including CINAHL, PubMed, Scopus and Web of Science to locate papers particular to the Indonesian context. From the total of 568 papers found, 20 papers were selected.

Results: The literature review identified physicians, nurses, pharmacists, dieticians and diabetes educators as the providers of diabetes care and management in Indonesia. Collaborative management involving either inter-disciplinary or intra-disciplinary teams, was mentioned in several papers. Internal challenges included: limited skills and knowledge. External challenges included: high patient volumes; a shortage of healthcare professionals and reduced funding.

Conclusions: Overcoming the challenges cannot be undertaken with a workforce dominated by any one single healthcare profession. Coordinating with the government to improve the implementation of different roles in diabetes management will improve patient outcomes and thus reduce the burden of diabetes.

Implication for nursing and health policy: Health policy reform should support nurses and other healthcare professionals in their professional development at all levels of healthcare. Policy makers can use the review findings to modify the current healthcare system to address key issues in: workforce development; funding for services and medications; and fostering multidisciplinary care for diabetes management.

Keywords: Chronic Disease Care; Developing Countries; Diabetes; Health Service Management; Indonesia; Literature Review; Nursing; Nursing Roles; Scoping Review

Introduction

The International Diabetes Federation (IDF) reports that diabetes presents an enormous global burden, with a global prevalence rate of 8.3% and 387 million people living with this disease (IDF 2013; IDF 2014). While developed countries have only a 20% increase in diabetes cases, it is predicted that Indonesia and other developing countries will have a 69% increase within three decades (Shaw et al. 2010).

In Indonesia, diabetes is widely acknowledged as a population health problem. The World Health Organization (WHO) reports that since 2012, diabetes has been a major cause of death in Indonesia (WHO 2014). Indonesia was ranked ninth in the world in terms of having people living with type 1 and type 2 diabetes mellitus in 2010. The same report indicates that by 2030 this ranking will increase to sixth position, with a projected 12 million affected adults (Shaw et al. 2010). However, research results on diabetes prevalence rates usually do not distinguish between diabetes type one and two (National Institute for Health Research and Development 2013; Mihardja et al. 2014; Soegondo et al. 2011).

Age, family history, obesity, smoking, hypertension, gender and physical activity are identified as diabetic risk factors for the Indonesian population (Mihardja et al. 2009; Soegondo et al. 2011). With a relatively low health expenditure on managing diabetes, adequate resources (Zhang et al. 2012) and

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3 wide-ranging approaches are required for screening, preventing and managing diabetes and the
4 complications (Mihardja et al. 2014). These management approaches need to involve healthcare
5 professionals (HCPs) from various health disciplines (Soewondo et al. 2010), as recommended by the
6 WHO (2016) and the IDF (2012).
7

8 Diabetes management, which focuses on glycaemic control through lifestyle modification and
9 medication, requires a person-centred approach that involves multi-disciplinary HCPs (Chatterjee &
10 Davies 2015). The benefits of multi-disciplinary teams include: complementary skills; better
11 developed relationships between HCPs; and most importantly, the person with diabetes having
12 improved access to assessment and treatment via additional contacts; all of which results in the person
13 being more supported in their self-management (Ritholz et al. 2011). While Ritholz et al.'s (2011)
14 study provides a solid case for multi-disciplinary teams, Shortus et al. (2007) found that a lack of
15 collaboration between HCPs providing care to people with diabetes was a problem with some team
16 members unconvinced that collaboration would improve health care delivery in fulfilling individuals'
17 complex care requirements, instead suggesting that working together in this way may decrease the
18 potential for holistic care. The contradiction in the evidence base concerning the provision of care to
19 Indonesian people living with diabetes indicates a gap in understanding about each HCPs' role.
20 Identifying the role that each can play in this complex space will provide clarity, avoid role overlap
21 and reduce the likelihood of any one HCP's role becoming dominant. With the global shortage of
22 HCPs able to provide care for those living with diabetes (IDF 2013), a shortage that includes
23 Indonesia (Soewondo et al. 2013), it is important to profile HCPs with expertise in diabetes care as
24 described in the Indonesian literature.
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27 **Background**

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29 As a low to middle income developing nation, Indonesia is challenged to control immense burdens of
30 both communicable diseases and chronic diseases (Ministry of Health Republic of Indonesia 2015).
31 These double burdens require a multidimensional approach (Bygbjerg 2012) with the aim to optimise
32 existing health services. Thus, HCPs can promote access and provide diabetes management for all
33 Indonesians living with diabetes.
34

35 In Indonesia, diabetes services are managed at various levels of the health care system. People with
36 diabetes usually go to *Puskesmas* (Public/Community Health Centres) to have their diabetes treated
37 (Widyahening et al. 2014). Once provided with a referral, people can choose to either go to a
38 secondary or tertiary health care setting to access outpatient and inpatient services, from either a
39 public or private hospital (Soewondo 2011; Hartayu et al. 2012). Healthcare service accessibility is a
40 concern for everyone, not just those with diabetes. Indonesia still struggles with health coverage as
41 not all Indonesians are covered by insurance, especially in remote areas (Kanbara et al. 2008) and
42 only 63% of Indonesians are covered by particular forms of health insurance that pay for chronic care
43 (Simmonds & Hort 2013).
44

45 A comprehensive national strategy for diabetes management is required for diabetes prevention and
46 its treatment (Mihardja et al. 2014). The WHO also emphasise that skilful HCPs should provide
47 accessible diabetes care both systematically and continuously (WHO 2016), ideally within a
48 multidisciplinary team (IDF 2012). There is, however, limited information about which HCPs are
49 providing diabetes care in Indonesia. A previous literature review on diabetes management in
50 Indonesia (Soewondo et al. 2013) mentioned only a few healthcare disciplines and did not provide
51 any specific job descriptions for these roles, giving rise to the concern that there may well be other
52 HCPs involved in diabetes care in Indonesia whose role has not yet been identified, let alone
53 described (Soewondo et al. 2013). There is also little evidence of models of multidisciplinary
54 diabetes care provision, with the national diabetes clinical practice guideline only focusing on a
55 single health discipline; medicine (Rudijanto et al. 2011; Indonesian Diabetes Association 2014). It
56 is vital therefore to explore which HCPs are involved in providing diabetes management and provide
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3 a clear description of their roles and the challenges they encounter in deploying their expertise. This
4 work would provide a strong foundation for making recommendations about the role each HCP
5 should perform to support an ideal diabetes care model of service, in the Indonesian context.
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7 **Study Aim**

8 This review aims to explore and synthesise scholarly literature about HCPs involved in the
9 management of diabetes within an Indonesian context.
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11 **Methods**

12 This scoping review paper provides a summary, explanation and interpretation of the breadth of the
13 currently available qualitative and quantitative evidence that addressed the review questions. A
14 scoping study framework uses a systematic approach with five distinct steps as detailed below, and
15 does not limit the review to only primary research papers, but allows relevant, high quality grey
16 literature to also be considered (Arksey & O'Malley 2005; Mays et al. 2005). This method enables
17 the review to extract divergent data and develop it in a meaningful, transparent and systematic way
18 (Grant & Booth 2009). The five essential steps are:
19

- 20 1. Identifying the research question(s)
- 21 2. Identifying relevant studies
- 22 3. Selecting the studies
- 23 4. Making a data chart
- 24 5. Collating, summarising and reporting the results

25 The following inclusion criteria were used: peer reviewed research and non-research papers including
26 grey papers (such as government or organisational reports) providing information about HCPs caring
27 for adults with diabetes type 1 and type 2; the role that HCPs perform when caring for adults with
28 diabetes type 1 and type 2; be situated in the Indonesian context; and be written in both English and
29 Indonesian languages. Conversely, exclusion criteria were papers reporting: laboratory based research
30 about diabetes; children with diabetes; studies involving animal testing and diabetes; and papers
31 discussing diabetes in conjunction with other chronic diseases.
32

33 **Step 1: Identifying the Research questions**

34 By having well-defined research questions, the scope of the studies included will be both practical and
35 effective (Levac et al. 2010). For this review, three research questions were addressed:
36

- 37 1. Who are the HCPs that provide care for people living with diabetes mellitus in Indonesia?
- 38 2. What roles do different HCPs undertake when providing diabetes management?
- 39 3. What challenges do HCPs encounter during the provision of diabetes management?

40 **Step 2: Identifying relevant published papers**

41 Before identifying relevant papers, the authors determined keywords based on the research questions.
42 The keyword "diabet*", from MeSH was used together with the following keywords: "healthcare
43 professional*", "healthcare personnel*", "management", "service*", "care" and "Indonesia*".
44 Electronic databases including CINAHL, PubMed, Scopus and Web of Science and other sources like
45 Google Scholar and Research Gate were searched using these terms to locate papers particular to the
46 context of Indonesia that met the inclusion criteria. A hand search was also performed to locate papers
47 ancestrally by searching specific journals and identified papers or reviews. Publication dates were
48 limited to 1970 to 2016 because a diabetes association was formed in Indonesia in the early 1970s,
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3 increasing knowledge and awareness of the condition and marking a new phase in the provision of
4 health care services and treatments.
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6 **Step 3: Selecting relevant papers**

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8 From the search, 567 papers were found (430 in English and 137 in Indonesian language). Among this
9 number, 134 papers were duplicates. After removing duplicate papers, 433 papers were assessed as
10 meeting the inclusion criteria. These 433 papers were further examined based on the inclusion criteria
11 by reading the titles and abstracts. Moreover, one grey papers were obtained and were added together
12 with the screened papers. The total of 50 peer reviewed papers (2 of which were in the Indonesian
13 language) and one grey paper were recorded and were read in full before finally selecting those
14 eligible for a full review. After the full texts were read and assessed against the review questions, 20
15 papers were deemed suitable for inclusion in the final data set. The selection of relevant papers was
16 based primarily on the research questions, rather than a critical appraisal process, although a
17 minimum standard of quality was required for inclusion. The reviewed research papers' quality is
18 usually not appraised in a scoping review as the review seeks the breadth of all available material
19 (Arksey & O'Malley 2005; Grant & Booth 2009). Undertaking detailed methodological critiques of
20 the studies may unduly limit the number of selected papers, and thus inappropriately exclude papers
21 that would still provide rich information to answer the research questions; therefore it is suggested to
22 include a wide range of methods and study designs to provide an appreciation of the scope or extent
23 of literature available on a thinly researched topic (Arksey & O'Malley 2005). The procedure used to
24 select the included papers is displayed in figure 1.
25
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27 **Step 4: Data charting**

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29 Each of the included 20 full text papers were read thoroughly, several times, in order to capture all the
30 relevant information and to ensure no important information was missed. A data set from the papers
31 was constructed by extracting findings relevant to the questions asked. The data set was refined
32 regularly by considering whether the extracted data were consistent with the review questions and the
33 study aim. The extracted dataset was categorised using: authors, study aims, study design, participants
34 or sample, and themes in a practical table (Table 1). The design of this data set was discussed among
35 the review authors to ensure all relevant information was included.
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37 **Step 5: Collating, summarising and reporting of results**

38
39 The NVivo software (QSR International 2016) was used to organise extracted data and aid the
40 authors in coding data extractions and consequently developing responses to the questions asked.
41 Arksey & O'Malley (2005) state that there are various way to collate and summarise, including
42 organising the data thematically. Thematic analysis helped to recognise, analyse and narrate patterns
43 identified in the data set (Braun & Clarke 2006). The themes reflect the key concepts that occurred
44 repeatedly in the texts (Mays et al. 2005) and answered the questions posed.
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47 **Results**

48
49 A total of 20 papers were reviewed. Almost all of the studies were quantitative studies and included
50 both experimental (Ng et al. 2010; Pemayun et al. 2015; Pranoto et al. 2015; Sae-Sia et al. 2013)
51 and non-experimental (Adriono et al. 2011; Arisandi et al. 2016; Haryanto et al. 2016; Padmawati et
52 al. 2009; Radji et al. 2014; Yusuf et al. 2013) designs, which investigated the assessment,
53 management and risk factors for diabetes. Interestingly, the oldest paper regarding HCP profile was
54 published in 2000. After reviewing the literature, three major themes were developed: diabetes
55 healthcare professionals; roles of diabetes healthcare professionals; and challenges encountered by
56 diabetes healthcare professionals. These themes are explained as follows.
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Diabetes Healthcare Professionals

All papers, except one (IDF 2014), identified several HCPs as responsible for caring for people with diabetes. These included: physicians; nurses; pharmacists; dieticians; and diabetes educators. Physicians were mentioned in most of the reviewed papers (n=16) and comprised both general practitioners (GPs) and specialised doctors such as internists, endocrinologists, infectious disease specialists, vascular surgeons, plastic surgeons, cardiologists and orthopaedic surgeons. Conversely, nurses were almost invisible in the context of the literature concerned with diabetes in Indonesia. Some papers (Arisandi et al. 2016; Haryanto et al. 2016; Pemayun et al. 2015; Sae-Sia et al. 2013; Soewondo et al. 2013; Yusuf et al. 2013) briefly mentioned the role of nurses in managing diabetes complications, such as diabetic foot ulcers. Most papers described nurses working in private clinics rather than in public hospitals (Arisandi et al. 2016; Haryanto et al. 2016; Yusuf et al. 2013). Only three studies described pharmacists as diabetes HCPs (Wibowo et al. 2015a; Wibowo et al. 2015b; Radji et al. 2014). These pharmacists worked in tertiary settings (hospital pharmacies) and primary settings (stand-alone pharmacies or a pharmacy integrated with a private clinic). Dieticians were also discussed in two papers reporting wound management for people with diabetes in a hospital setting (Pemayun et al. 2015; Purnamasari & Waspadji 2009). Similarly, another two papers investigated diabetes educators, but they did not specify the type of health care setting. These two papers were published 17 years apart indicating the paucity of research being conducted in this area (Malini et al. 2017; Sutanegara et al. 2000).

Roles of Diabetes Healthcare Professionals

The second review question asks what role each of these HCPs undertook when providing diabetic care. To answer this question, the literature was examined for specific activities and duties that each HCP performed when providing diabetic management to people in Indonesia. The role most evident in the literature, physician, will be discussed first.

The physician's role was prevalent in most of the papers reviewed (Adriono et al. 2011; Faillace et al. 2012; Ng et al. 2010; Padmawati et al. 2009; Pemayun et al. 2015; Pranoto et al. 2015; Purnamasari & Waspadji 2009; Sae-Sia et al. 2013; Soewondo et al. 2013; Soewondo et al. 2010; Wibowo et al. 2015b; Widyahening et al. 2014). The role of the physician included undertaking examinations, providing treatment and counselling individuals with diabetes. The physician played an important role in referring people with diabetes to a higher level of care that better suited their needs, for example from a primary health care (PHC) facility to a secondary healthcare facility (Pranoto et al. 2015) or to a specialist physician, such as an ophthalmologist (Adriono et al. 2011). The physician's role included screening people for diabetes, diagnosing diabetes and conducting specific examinations such as eye and foot examinations (Faillace et al. 2012; Sae-Sia et al. 2013; Adriono et al. 2011).

The physician's role also included providing treatment in the form of prescribing medication and providing wound management services to people with diabetes, who may or may not have experienced complications. Providing counselling (Padmawati et al. 2009; Ng et al. 2010) and education (Sutanegara et al. 2000) to people with diabetes was also articulated in the literature. This type of consultation was largely about diet and medication (Padmawati et al. 2009), and information on smoking cessation related to diabetes or diabetic foot care was also mentioned, but less often (Padmawati et al. 2009; Sae-Sia et al. 2013; Ng et al. 2010).

Generally, the role of nurses in diabetes management was poorly described in the literature. However, when discussing people who were experiencing specific complications, for example a diabetic foot ulcer, the role became more evident. Three papers explained the role that wound care nurses

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3 undertook to assess diabetic foot ulcers; this mostly occurred in the setting of private clinics (Sae-Sia
4 et al. 2013; Arisandi et al. 2016; Haryanto et al. 2016). Predominately the literature showed that
5 assessing diabetic foot ulcers was undertaken by either a physician and/or a nurse. However, one
6 paper written by Yusuf et al. (2013) described the role of nurses employed in a wound care clinic that
7 did not provide medical treatment. The nurses worked quite independently, providing a high standard
8 of wound assessment care. A collaborative working relationship between nurses and physicians
9 (dermatologists) was also represented in Arisandi et al.'s (2016) study, which described the
10 development of a valid instrument in assessing diabetic foot ulcer.
11

12 Two papers have reported that one established role of a pharmacist is dispensing medications and
13 providing education to people on how to take and use their medications correctly and safely (Wibowo
14 et al. 2015a; Wibowo et al. 2015b). Another more specific role of the pharmacist, is in the prevention
15 of diabetic foot infections (Radji et al. 2014). Two studies found that pharmacists advocated to
16 extend their role to include assessment, patient education, treatment and monitoring of people with
17 diabetes (Wibowo et al. 2015a; Wibowo et al. 2015b). While pharmacists thought the extension of
18 their role was important, the majority of the physicians did not support this extended role; for
19 example, one physician in Wibowo et al.'s (2015b) study thought that the extended role would be
20 impractical as physicians did not agree with the recommendations made by pharmacists.
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23 A stand-alone role for the dietician was not evident in the literature. In Pemayun et al. (2015), the role
24 of the dietician was only generally described as working collaboratively with other hospital HCPs in
25 delivering wound management as per standard wound care protocols, with no specific tasks
26 delineated. In contrast, Purnamasari & Waspadji (2009) clearly stated the role of the dietician was to
27 provide nutritional therapy for people with diabetic foot ulcers.
28

29 Similar to the dietician, the diabetes educator's role was only briefly stated in two secondary sources
30 (Malini et al. 2017; Sutanegara et al. 2000). Both papers highlighted the scarcity of diabetes
31 educators. Furthermore, a number of different types of HCPs can choose to become diabetes
32 educators by undertaking further education in this area. Malini et al. (2017) and Sutanegara et al.
33 (2000) did not explain what the original role of the HCPs were in these papers, prior to them
34 becoming diabetes educators; nor clearly delineated their new diabetes education role.
35

36 Collaborative management involving either inter-disciplinary (Arisandi et al. 2016; Haryanto et al.
37 2016; Pemayun et al. 2015; Purnamasari & Waspadji 2009) or intra-disciplinary teams (Adriono et
38 al. 2011; Faillace et al. 2012; Soewondo et al. 2010) were mentioned in several papers. An inter-
39 disciplinary collaboration of a dermatologist and a nurse wound specialist resulted in the development
40 of a valid instrument for assessing diabetic foot ulcers (Arisandi et al. 2016) and Pemayun et al.
41 (2015) explored how a team of medical, nursing and nutrition HCPs helped to manage people who
42 had diabetic foot ulcers while monitoring their risk for amputation. Purnamasari & Waspadji (2009)
43 illustrated how medical and nutrition teams worked together to manage diabetic foot ulcers for people
44 living with diabetes, by providing holistic care that included pressure relief management, nutrition
45 therapy, antibiotic provision, wound care and patient education. Two papers described intra-
46 disciplinary collaboration of the physicians' established role in different hospital departments, such as
47 the endocrinology clinic and eye clinic (Adriono et al. 2011; Faillace et al. 2012). Both clinics
48 worked collaboratively to provide diabetes education and eye examination to people newly diagnosed
49 with diabetes and annual screening for people previously diagnosed.
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52 **Challenges Encountered by Diabetes Healthcare Professionals**

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54 This review has recognised several challenges faced by HCPs in managing diabetes in Indonesia. The
55 challenges are classified into internal and external challenges.
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57 *Internal challenges*

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3 Malini et al. (2017) highlighted limited skill of HCPs in delivering diabetes education. The authors
4 asserted that a lack of skill was the result of inadequate training and further described that existing
5 clinicians who provided diabetes education did not have specific training about diabetes and therefore
6 delivered unstructured diabetes education.
7

8 Actual limited knowledge and skill in providing diabetes care was also reported in Pranoto et al.
9 (2015), who studied the safety and efficacy of insulin therapy initiation provided by GPs. Pranoto et
10 al. (2015) argued that GPs had limited knowledge in dispensing insulin at PHC clinics and more
11 specifically reported deficits in the areas of indication, dosage, regimen selection, blood glucose self-
12 monitoring and insulin side effects. Fear of the adverse side effects of insulin therapy also made GPs
13 more hesitant to provide insulin in PHC settings (Pranoto et al. 2015).
14

15 Besides the actual limited knowledge and skill, perceived limited knowledge and skill was also
16 identified. Wibowo et al. (2015b) claimed that other HCPs were reluctant to support pharmacists in
17 taking on extended roles in direct patient care due to pharmacists' perceived lack of knowledge. In
18 Faillace et al. (2012), physicians were perceived to have limited skill and knowledge in alerting
19 people to the risk of diabetic retinopathy as well as the need for eye screening. Regardless of whether
20 the people have diabetic retinopathy or not, they need to have their eyes checked regularly every year
21 (Faillace et al. 2012).
22

23 *External challenges*

24 High patient volumes and a shortage of HCPs are still major issues challenging the provision of
25 diabetes healthcare in Indonesia. An overload of people with diabetes has resulted in HCPs having
26 limited time to screen all people with diabetes for diabetic neuropathy (Soewondo et al. 2010) and
27 even to educate people with diabetes individually (Sutanegara et al. 2000). There is also an unequal
28 number of HCPs working in urban and rural areas (Soewondo et al. 2013). For example, diabetes
29 educators are mostly located in major cities (Malini et al. 2017; Sutanegara et al. 2000).
30
31

32 Underfunding was cited as another challenge faced by HCPs in managing diabetes (Soewondo et al.
33 2013). Underfunding contributes to reduced distribution of medications to all geographic areas of
34 Indonesia and in certain health care levels, for example insulin is not distributed to PHC settings or
35 "Puskesmas" (Pranoto et al. 2015; Soewondo et al. 2013).
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38 **Discussion**

39 The current scoping review is the first to describe the profile of HCPs working in diabetes care in
40 Indonesia. Information about the role that each HCP performs has also been described. Significant
41 findings from the reviewed papers indicated that some systemic improvements are required for HCPs
42 to better manage and care for Indonesian people with diabetes; the suggested areas for improvement
43 vary, depending on the HCP in question.
44
45

46 The literature reviewed in this paper has shown the physician has an established and visible role,
47 opposed to other diabetes HCPs, whose roles were less visible. Even though the role of physicians is
48 more evident in the literature as compared to other HCPs, it does not mean the role of other HCPs is
49 insignificant or non-existent. It merely implies that the role of the physician has been studied more
50 extensively in the literature in reference to the Indonesian context. Other HCPs roles were identified
51 in the literature, however, these roles still need development in the areas of providing patient
52 information and providing diabetes care, for example diabetes foot care (Sae-Sia et al. 2013).
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55 The literature has suggested that both intra-disciplinary and inter-disciplinary working relationships
56 need to be maintained and improved (Radji et al. 2014; Wibowo et al. 2015b). A collaborative
57 multidisciplinary team is recommended and required for systematic diabetes care (IDF 2012; WHO
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2016). Maintaining collaborative working relationships is important for helping each HCP to fully contribute to overcoming the massive burden of diabetes in Indonesia. Collaborative working relationships need to foster the creation of a comprehensive diabetes management plan for individual people that includes: education, medication, exercise and diet. Involving HCPs from multiple disciplines will improve patient outcomes and cost effectiveness (Bratcher & Bello 2011). Moreover, intra- and inter-disciplinary collaborations are vital in preventing people with diabetes from developing secondary complications; for example nurses working collaboratively with a wound nurse specialist to monitor people at risk of a diabetic foot ulcer and also facilitating individuals to self-manage foot care at home.

The literature reviewed here indicated that HCPs have a lack of skills and knowledge in providing diabetes care and informing people with diabetes of its risks (Faillace et al. 2012; Sutanegara et al. 2000; Wibowo et al. 2015b). Lack of skill and knowledge was recognised by the HCP themselves or by another group of HCPs; it may then lead to a reluctance to respect and concur with their recommendations (Wibowo et al. 2015b). It is therefore vital for the HCPs to continually increase their skill and knowledge specific to diabetes, because the formal education they have received about diabetes care may not be adequate (Livingston & Dunning 2010) to manage complex diabetic presentations. Having specific skills is necessary to complement each other's roles (Gucciardi et al. 2016) and to improve diabetes care (Ugur et al. 2015). Thus, HCPs need to be more highly skilled in managing people with diabetes with physical complications or psychological impacts in a creative way, especially those who live in rural and remote areas having a deficit of either human or non-human resources.

Unequal distribution of diabetes expertise occurs among clinical settings and among geographic areas where the concentration of diabetes expertise is greater in urban areas than rural areas (Soewondo et al. 2013). Conversely, the diabetes prevalence rate in rural areas is higher compared to urban areas (National Institute for Health Research and Development 2013). Despite a geographical issue in accessing rural areas, the unequal distribution can be further exacerbated by low salaries for HCPs and is hampered by either low health workforce production and/or reduced HCP graduates' employment capacity (Kanchanachitra et al. 2011). It is the responsibility of government to reform the policy that supports both HCPs and people with diabetes by increasing, supporting and appreciating the commitment of HCPs working in rural areas; for example ensuring the cost of living in rural areas does not outweigh the salary.

While filling the positions for HCPs in rural areas is one problem, it becomes even more imperative to equip those few currently available HCPs with specific, comprehensive diabetes related knowledge and skills through professional development training. In poor resource areas, it may not be possible to increase the number of HCPs, so a more workable solution can be to increase the skill of the existing HCPs, as another way to achieve a skilful multidisciplinary care team (WHO 2016). Provision of continuing professional education can motivate HCPs working in rural areas (Efendi 2012). As there is an imbalance of expertise at all health care levels, HCPs working in PHC settings should have their skills improved in order to enhance their roles.

In a developing country like Indonesia, a substantial problem hindering the optimum implementation of HCPs' roles is funding issues such as health insurance, affordable diabetes medications for people with diabetes and updating the HCPs' skills. Acknowledging diabetes as a national problem is imperative to ensure that there will be a fair proportion of funding allocated for diabetes management, especially for people with low incomes and/or living in rural or remotes areas. Also, investing human and non-human resources in developing countries is recommended for the prevention of diabetes complications (Ezenwaka et al. 2014) by financially supporting the HCPs to update their skills regularly. Consequently, creative and skilful HCPs will still be able to perform their important role despite the lack of resources available.

Strengths and Limitations

A strength of this literature review is that the search was very comprehensive, dating back to 1970. At this time, there was increasing awareness of diabetes in Indonesia that gave rise to the founding of the Indonesian Diabetes Association in 1976. Another strength is that the search included both Indonesian and English language papers. While, the electronic databases used may have limited the number of Indonesian language papers located; the use of Google Scholar and Research Gate mitigated this effect.

Implications for education, nursing practice, health policy and research

This review underlines the challenges faced by HCPs' that arise from having limited skills and knowledge in diabetes care (Malini et al. 2017; Pranoto et al. 2015). HCPs need to participate in continuing professional education to more expertly manage people with diabetes, particularly those with secondary complications. This strategy will also help address the shortage of HCPs in both rural and urban geographical areas because each available HCP will be more highly skilled. Healthcare facilities' administrators should provide opportunities for HCPs to continue their professional development.

Only two papers suggested that working collaboratively to provide diabetes care, should be maintained and improved (Radji et al. 2014; Wibowo et al. 2015b). Multidisciplinary collaborations are vital in preventing people with diabetes from developing secondary complications. Therefore, health care facilities in both rural and urban areas should establish a model of multidisciplinary teams that consist of HCPs who are highly skilled in providing care to people with diabetes.

Nationally, health policy reform must increase funding and improve insurance coverage to cover the cost of diabetes medications and to support HCPs in their professional development, at all levels of healthcare. Also, findings from this review can be used to inform health policy makers, both in Indonesia and in other countries with similar disease profiles and resourcing challenges, to modify their current healthcare systems. Modifications should address: ensuring an adequately sized, highly skilled diabetes workforce; more appropriate distribution of the workforce across all levels of care and all geographic locations; and fostering both structural and philosophical changes that will establish and sustain true multidisciplinary care.

There were limited studies about what types of tasks the Indonesian nurse performed in the care of people with diabetes. Therefore, it is crucial to conduct research in this area to fully understand the nurses' role in this context. Increasing visibility of the role of the nurse will also serve to illustrate and acknowledge the significant work that nurses do in this area, both nationally and internationally. Illuminating the role of the nurse may be helpful in developing more feasible models of care to promote high quality diabetes management.

Conclusion

With the current prevalence rates of diabetes expected to increase over time, Indonesia needs a comprehensive strategy to prevent and manage the resultant burden of disease. Developing models of multidisciplinary care recommended by the international health organisations will make a significant difference to the impact this burden of disease will make on Indonesian society. Within a context of very limited scholarly information on diabetes HCPs and the application of the multidisciplinary care models in Indonesia, this paper has explored the profile of diabetes HCPs in Indonesia by identifying which professions they belong to and describing their roles. Both internal and external challenges they encounter in providing high quality diabetes care were also identified in this review. The challenges identified in this paper will enlighten global nurses and other diabetes HCPs about the current models

of care with a view to improving diabetes management in this country. Also, this paper contributes to better understanding of the international context of diabetes care where it is commonly accepted that collaborative management is essential, especially in countries with limited human and non-human resources in the context of rapidly rising rates of chronic conditions.

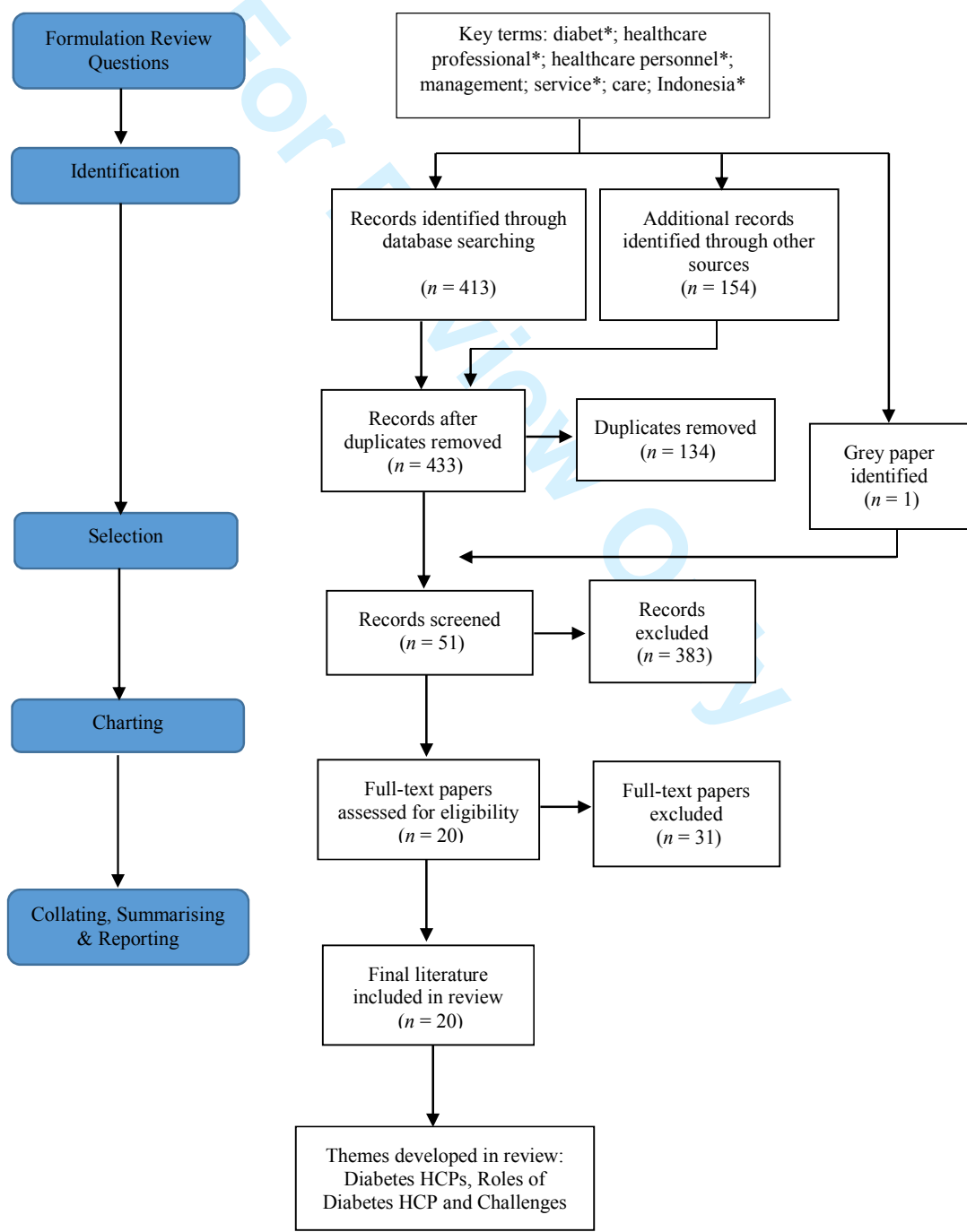
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8 **Figure 1. The search strategy recorded in a flowchart, adopted from Moher et al.'s (2009)**
9 **PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) and Arksey**
10 **& O'Malley's (2005) scoping study framework stages.**
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For Review Only

Table 1. Summary of selected papers

Authors	Aims	Designs	Participants & Samples	Themes
Adriono et al. (2011)	To assess the use of eye care and predictors among urban people with diabetes in Indonesia	Cross sectional study	(<i>n</i> = 198) patients with type 2 diabetes	Diabetes HCP Roles of Diabetes HCP
Arisandi et al. (2016)	To evaluate the validity of an assessment scale for diabetic foot ulcer	Prospective cohort study	(<i>n</i> = 62) patients with diabetic foot ulcer	Diabetes HCP Roles of Diabetes HCP
Faillace et al. (2012)	To describe the provision of diabetic retinopathy care	Discussion paper	Not provided	Diabetes HCP Roles of Diabetes HCP Challenges
Haryanto et al. (2016)	To identify the relationship between maceration and wound healing	A prospective study	(<i>n</i> = 62) patients with diabetic foot ulcer	Diabetes HCP Roles of Diabetes HCP
Malini et al. (2017)	To review literature on the application of western models of diabetes education implemented in Indonesia	Literature review	(<i>n</i> = 11) papers	Diabetes HCP Challenges
Ng et al. (2010)	To examine the feasibility of interactive smoking cessation interventions for diabetes mellitus patients in clinical settings	Randomised clinical trial	(<i>n</i> = 66) patients with diabetes in cessation clinic group or in doctor advice group and (<i>n</i> = 6) doctors	Diabetes HCP Roles of Diabetes HCP Challenges
Padmawati et al. (2009)	To report a study about the prevalence of tobacco used by male diabetes patients, patients' perceptions on the risk of smoking and the provision of tobacco related message from the doctors to the patients	In-depth interview, focus group discussion and cross sectional survey	(<i>n</i> = 21) diabetes patients and (<i>n</i> = 778) male diabetes patients	Diabetes HCP Roles of Diabetes HCP Challenges
Pemayun et al. (2015)	To identify and determine the number of subsequent amputation risk factors in hospitalised patients with diabetic foot ulcers	Case control	(<i>n</i> = 47) Patients with diabetic foot ulcers with lower extremity amputation and (<i>n</i> = 47) patients without lower extremity amputation	Diabetes HCP Roles of Diabetes HCP
Pranoto et al. (2015)	To analyse early insulin therapy safety and efficacy for type 2 diabetes mellitus patients provided by general practitioners in primary health care in Surabaya, Indonesia	Pre and post study	(<i>n</i> = 99) patients with diabetes mellitus type 2	Diabetes HCP Roles of Diabetes HCP Challenges
Purnamasari & Waspadji (2009)	To describe teamwork for diabetic foot ulcer treatment	Case report	A patient with diabetic foot ulcer	Diabetes HCP Roles of Diabetes HCP
Radji et al. (2014)	To determine microbiology of diabetic	Retrospective cross	(<i>n</i> = 35) patients admitted to	Diabetes HCP

Authors	Aims	Designs	Participants & Samples	Themes
	foot infections and to assess the antibiotic susceptibility pattern	sectional study	hospital during a one year period; hospital length stay between 6 and 10 days	Roles of Diabetes HCP
Sae-Sia et al. (2013)	To examine the effectiveness of self-management support programs for people with diabetes living in Indonesia, which help improve foot care behaviour	Quasi experimental study	(n = 35) patients in control group and (n = 35) patients in intervention group	Diabetes HCP Roles of Diabetes HCP
Soewondo et al. (2010)	To identify patients' diabetes management, complications and awareness of self-control	Cross sectional study	(n = 1832) patients with type 1, type 2 diabetes mellitus and other types of diabetes, (n = 18) physicians	Diabetes HCP Roles of Diabetes HCP Challenges
Soewondo et al. (2013)	To review evidence on burden, expenditure, complications, treatment and outcomes of diabetes in Indonesia and the implications on health system developments	Literature review	(n = 23) papers	Diabetes HCP Challenges
Sutanegara et al. (2000)	To describe epidemiology of diabetes and diabetes management in Indonesia	Discussion paper	Not provided	Diabetes HCP Challenges
Wibowo et al. (2015a)	To evaluate current community pharmacy-based services, to identify pharmacists' perceived roles in type 2 diabetes care and to explore characteristics of pharmacy and pharmacists associated with current practice	Survey	(n = 240) pharmacists from 240 community pharmacies	Diabetes HCP Roles of Diabetes HCP Challenges
Wibowo et al. (2015b)	To explore physician and pharmacist perspectives about diabetes service delivery within community pharmacies in Indonesia	In-depth interview	(n = 10) community pharmacists and (n = 10) physicians	Diabetes HCP Roles of Diabetes HCP Challenges
Widyahening et al. (2014)	To identify the level of awareness, agreement, adoption and compliance on the guidelines of type 2 diabetes mellitus	Cross sectional study	(n = 399) physicians who provide diabetes care, year of practice between 0-45 years	Diabetes HCP Roles of Diabetes HCP Challenges
Yusuf et al. (2013)	To investigate the challenge in developing an enterostomal therapy nurse (ETN) outpatient clinic in Indonesia	Retrospective descriptive study	(n = 73) patients with acute and chronic wound care, (n = 18) patients with diabetic foot ulcer	Diabetes HCP Roles of Diabetes HCP Challenges
IDF (2014)	To describe diabetes and diabetes management in Indonesia	Score card	Not provided	Challenges

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Response to Review Decision

Comments	Responses on How and Where Changes have been Made
<p><i>Associate Editor</i></p> <p>1. As noted by our external reviewer, this revised manuscript is responsive to prior review suggestions. I concur with the reviewer that the rationale for your review and its contributions to the international literature regarding multi-professional management of diabetes needs strengthening. The review has given very helpful suggestions for doing that and I encourage you to follow those suggestions. Thank you for your efforts in improving the manuscript.</p>	<p>The background, the implications and the conclusion sections have been refined and revised to improve the manuscript. We also emphasised on the paper’s contributions to the global understanding.</p> <p>Background <u>Original Version:</u> Page 2, paragraph 5 <u>Revision Version:</u> Page 2, paragraph 5 Page 3, paragraph 1</p> <p>Implications <u>Original Version:</u> Page 1, abstract section Page 9, paragraph 3 <u>Revision Version:</u> Page 1, abstract section Page 9, paragraph 4 and 5</p> <p>Conclusion <u>Original Version:</u> Page 9, paragraph 4 <u>Revision Version:</u> Page 9, paragraph 6</p>
<p>2. If you look at the attached Cross Check report you will find that it has a xx% non-originality score. Paraphrase what has already been published. Please look</p>	<p>We have revised the highlighted words where the similarities index exist. However, some words and phrases cannot be changed for various reasons. First, they are the standard in referencing, for example “et al.”. Second, some phrases such as “with diabetes type 1 and type 2” or “rural and</p>

<p>carefully at our author guidelines (attached) to find out how you need to reference material. Critically all references need to be done correctly. When directly citing material, note that more than 6-7 words must be put in double inverted commas (" ") and the author and year and page number included. However we prefer paraphrasing of material with correct referencing.</p>	<p>urban” are commonly used and thus we did not change these phrases.</p>
Comments	Responses on How and Where Changes Have been Made
<p><i>Reviewer 1</i></p> <p>1. “There is however, limited information about which HCPS are providing diabetes care in Indonesia. There is also little evidence of models of multidisciplinary care provision. It is vital therefore to explore which HCPs are involved in providing diabetes management services in the Indonesian context.” These sentences are relevant because they give the rationale of the scoping review. However, they need to be strengthen by authors. If you say that limited information is available, please tell the readers what is actually know and what is not known. The same for the models of multidisciplinary care. What little evidence you mean? What’s the gap? Please give reference also. After doing this, the authors should clearly state the need to perform their</p>	<p>We have changed the background by adding some sentences to make the rationale be more obvious.</p> <p><u>Original Version:</u> Page 2, paragraph 5</p> <p><u>Revision Version:</u> Page 2, paragraph 5 Page 3, paragraph 1</p>

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<p>review. Why this review is timely and needed? What kind of need this review will answer? Considering the lots of paper available internationally on the multidisciplinary diabetes team, the authors should be very clear when stating that this kind of review is needed. I think the rationale should be expanded and clearly stated at the end of the background.</p>	
<p>2. I found that implications are present in both this paragraph, and some concept is repeated as well. Real conclusions are missing actually. I strongly suggest to avoid repetitions, to put all the implications (policy, practice, research) in the Implication paragraph and to reformulate conclusions (restate the initial problems and concepts, briefly give the key messages of your work, state the contribution to the international knowledge, do not repeat the implications here). The international contribution should be emphasized more. Please try to say better how this scoping review can integrate the international knowledge on diabetes care management and HCPs.</p>	<p>We also have revised both the implication and the conclusion sections. The implication, especially on the policy, has been strengthened. Therefore, the abstract (implication for nursing and health policy) has also been revised.</p> <p><u>Original Version:</u> Page 1, abstract section Page 9, paragraph 3</p> <p><u>Revision Version:</u> Page 1, abstract section Page 9, paragraph 4 and 5</p> <p>The conclusion has also been refined by changing and adding some sentences to highlight contributions to international knowledge that this paper has added.</p> <p><u>Original Version:</u> Page 9, paragraph 4</p> <p><u>Revision Version:</u> Page 9, paragraph 6</p>