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Information quality measurement model of diabetes management in primary healthcare: Confirmatory factor analysis

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ABSTRACT

Noninsulin-Dependent-Diabetes-Mellitus (NIDDM) requires immediate treatment in primary healthcare to prevent early complications and reduce the economic burden on the health system and society. The application of supply chain management in health services has been proven effective, especially in logistics. However, information sharing that is essential for successful NIDDM management programs in primary healthcare has not received much attention. The novelty of this study is to utilize information supply chain principles for effective NIDDM management, as an approach to improve diabetes care. This study brought in instruments information supply chain that can be used to evaluate the information quality of NIDDM management. The primary data collection was conducted among all 104 physicians from 45 primary healthcare centers who have used the information for NIDDM management. A Confirmatory Factor Analysis (CFA) was conducted to test the final model's suitability. The results showed that the question items from the three factors tested were valid. The invariant test demonstrated the goodness of fit test results (GFI = 0.931, CFI = 0.964, RMSEA = 0.069). Based on the result, it can be concluded that the hypothetical model is suitable for the final size model. The relationship between items and factors is appropriate for assessing the NIDDM primary healthcare information supply chain model.

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Introduction

Diabetes is a complex chronic disease that increases the risk of cardiovascular diseases, neuropathy, retinopathy, nephropathy, and other medical conditions when not controlled properly. It is perceived as the most common serious disease with an increasing prevalence in almost all parts of the world, particularly in developing countries [1,2]. Type 2 diabetes mellitus, known as non-insulin-dependent-diabetes-mellitus (NIDDM) is the most common diagnosis found in the community compared to others, accounting for over 90% of all cases globally. According to the International Diabetes Federation (IDF), the number of people with diabetes mellitus in Indonesia is projected to increase from 9.1 million in 2014 to 14.1 million in 2035 [3]. Therefore, immediate treatment is necessary to prevent various early complications and reduce the economic burden on the healthcare system and society [4]. The increasing NIDDM prevalence in developing countries also requires strengthening preventive and promotive efforts for proper management [3,5].

In Indonesia, NIDDM is included in the chronic disease management program in primary healthcare, which focuses on limited preventive, promotive, and curative efforts [6]. Primary healthcare is a government-owned facility that is considered a basic health service in the community [2,7]. The availability of appropriate continuous medical data for NIDDM in primary healthcare is needed to support physicians' performance as care coordinators and improve program outcomes [8]. Communication between healthcare professionals within the facility is facilitated through documentation and exchanging information. Adequate written documentation is essential in providing continuous information and high-quality care [9,10]. Currently, supply chain management (SCM) is considered to have an important impact on reducing costs and improving the performance of healthcare organizations [11]. The information supply chain is used to structure and design the production, flow, improvement, and availability of information [12]. It is also based on SCM, which meets information requests in a highly responsive and efficient manner.

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Furthermore, it uses information requirement planning (IRP) for consideration, planning, and fulfillment of needs with helpful information [12,13]. A healthcare supply chain is integrated with healthcare providers to diagnose, treat, and care for patients [14]. The development of health information technology greatly contributes to the supply of medical data.

Reviewing the existing medical record system to assess the information quality produced will be very useful in designing electronic systems according to their needs and updates [15]. The previous research conducted by Werdhani et al. succeeded in developing an instrument to measure physicians' performance as care coordinators in primary healthcare. Based on the results, the medical documentation provided health data, which were processed into valuable and meaningful information [8]. Laila et al. also used the Catch-ch-Ing audit instrument developed by Bjorvell, Thorell-Ekstrand, and Wredling (2000). The Cat-ch-Ing audit instrument was designed to assess the information of nursing documentation quantitatively and qualitatively [15]. There are many instruments to assess the success of information quality. An instrument to measure the information quality of the healthcare information supply chain is needed, specifically for NIDDM chronic disease management. The measurement of information quality tends to be on the technology system used. However, perceptions of physicians as coordinator of health services also require attention, including the need for good quality information to support their performance. This makes it necessary to develop an instrument to measure information quality based on physicians' needs.

Methods

An exploratory mixed-methods design was conducted to develop the measurement tool.

In the first stage, we used a qualitative approach to generate what are information that physicians as NIDDM care coordinator need to provide services in the primary healthcare. We interviewed 19 physicians, and the data was saturated. Through this stage we successfully construct definition, generate domain content, and assessment items. After that, we conducted a Focus Group Discussion (FGD) with all the care coordinators that we interviewed previously and the head of primary healthcare as stakeholders. Seven of the interviewees are also the head of primary healthcare. We conducted 3 groups of FGD that consist of 10 participants in each group. These FGDs objective was to get their feedback on the items we generated from the interviews. The FGD participants agreed all the assessment items.

Next an evaluation of validity and reliability of the assessment items – we called it as scale – was conducted using Content Validity Index (CVI), Exploratory Factors Analysis (EFA), and Confirmatory Factors Analysis (CFA).

The assessment items from the qualitative results were analyzed by a panel of 8 experts: 3 lay and 5 content experts. The ideal number of expert panels is a minimum of 5 people and a maximum of 10 people to obtain sufficient control of the deal opportunities [16,17]. The results from the expert panel's viewpoint judgment were assessed through the content validity index (CVI), from 3 latent (main) factors. Meanwhile, each factor has 5 items, which was reduced to 3. Based on the CVI score criteria, the item ≤0.80 needs to be eliminated [17]. The scale tested for construct validity was a scale that had been declared valid based on the results of the CVI test. The scale in the form of a questionnaire consisted of 3 main factors, namely: accessibility, safety, and efficiency, consisting of 9 items as indicators. The scale was tested for construct validity using exploratory factor analysis (EFA) method, which was conducted by recruiting 64 respondents who work as physicians in the management of chronic disease NIDDM from 50 primary healthcare facilities in Indonesia.

Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) was used to identify the relationship between indicators and factors to obtain a fit final measure model. Respondents were recruited from 2 regencies in Central Java with similar characteristics, based on demographics and local stakeholder policies related to health services. The inclusion criteria were physicians as care coordinators who regularly provided services for managing chronic NIDDM at primary healthcare. Meanwhile, the exclusion criteria were physicians with less than one year of experience in the chronic disease management of NIDDM at primary healthcare. This research successfully involved 104 physicians from 45 primary healthcare facilities as respondents. The ethical approval was obtained from the Medical and Health Research Ethics Committee (MHREC) of Gadjah Mada University, Indonesia (number: KE/FK/0042/EC/202).

This research used a scale that has been tested for construct validity using Exploratory Factor Analysis (EFA). The scale consisted of 3 main factor domains, namely accessibility, safety, and efficiency, with 9 indicators related to information quality in health information SCM to support physicians' performance. Accessibility was related to the need for access to patients' medical data to support physicians as care coordinators. Security related to the protection of medical data provided, trusted, legal and confidential. Furthermore, efficiency was defined as considerations of cost, quality, time, and effort.

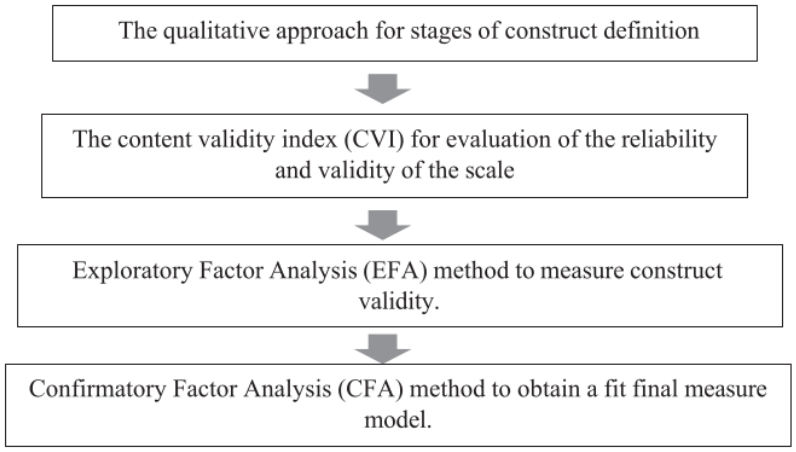

Figure 1. The flow of instrument development method.

Lawley and Maxwell explained that the multivariate statistical method aimed to determine the relationship between a set of items or indicators observed with a small number of latent variables, called factors. This new development of factor analysis approached a 'hybrid' form of modeling, combining the flexibility of EFA with some of the advantages of CFA [18,19]. The validation of the scales was carried out using the CFA method with the AMOS 24 software to assess dimensions as a feature of the internal structure of the scales [19]. Fit indices such as the Goodness of Fit Index (GFI), Comparative Fit Index (CFI), and Root Mean Squared Error of Approximation (RMSEA) were used to determine model fit (Figure 1).

Results

Respondents' characteristics

There were 73% females and 27% males with an average age of 38 years and an age range of 21–60 years. They were physicians who have worked as care coordinators in primary healthcare in the NIDDM chronic disease management for a minimum of 1 year to more than 10 years. The demographic characteristics are shown in Table 1.

Data normality results

Before the CFA analysis, the data set was filtered to determine outliers, and a normality test was performed to meet the CFA assumptions. Data transformation was not carried out because the skewness value was within ± threshold value. Table 2 shows that each question item did not provide a value in the Critical Ratio (C.R.) column, which was above 2.58 or below −2.58. Therefore, the data were normally distributed. The scale also consisted of 3 factors, namely accessibility, safety, and efficiency. The loading factors for items 1–9 were significant (>0.5), based on the grouping in Figure 2 the factors were mutually correlated and significant; there was no correlation value >0.85 between accessibility, safety, and efficiency.

Goodness of fit

The results of Goodness of Fit as shown in Figure 2 and Table 3 indicated the Chi-square value of 35.762 with a probability of 0.058, indicating a good fit of the model because it was consistent with the recommended values. The Goodness of Fit criteria based on AGFI and TLI were close to the recommended or marginal values. However, other fit criteria must be identified, specifically GFI, CFI, and RMSEA, to conclude the overall goodness of fit for the model. The GFI, CFI, and RMSEA with values of 0.931, 0.964, and 0.069 indicated that the fit model was consistent with the recommended values. Based on the results of the Goodness of Fit test, this showed that the hypothetical model was supported by empirical data, or the model can be declared to fit well with the data.

Table 1. Demographic characteristics of participants.

	Variable	*N*	Percent
Gender	Female	77	73%
	Male	28	27%
Age	21–30 years old	28	27%
	31–40 years old	38	36%
	41–50 years old	27	26%
	51–60 years old	12	11%
Employment Status	Civil Servants (PNS)	69	66%
	Non-Civil Servants (Non-PNS)	19	18%
	Civil Servant Candidate (CPNS)	17	16%
Working Period	1–3 years	38	37%
	>3–5 years	4	4%
	>5–10 years	21	20%
	>10 years	42	40%

Table 2. Data normality results.

Variable	min	max	skew	C.R.	kurtosis	C.R.
item7	2.000	5.000	−0.265	−1.102	0.413	0.859
item8	2.000	5.000	−0.542	−2.255	0.733	1.527
item9	2.000	5.000	−0.541	−2.252	0.653	1.359
item4	2.000	5.000	−0.526	−2.190	0.881	1.834
item5	2.000	5.000	−0.258	−1.075	0.624	1.299
item6	3.000	5.000	0.030	0.125	−0.256	−0.533
item1	2.000	5.000	−0.445	−1.853	0.910	1.895
item2	2.000	5.000	−0.590	−2.455	0.749	1.559
item3	2.000	5.000	−0.414	−1.724	0.774	1.612
Multivariate					31.273	11.332

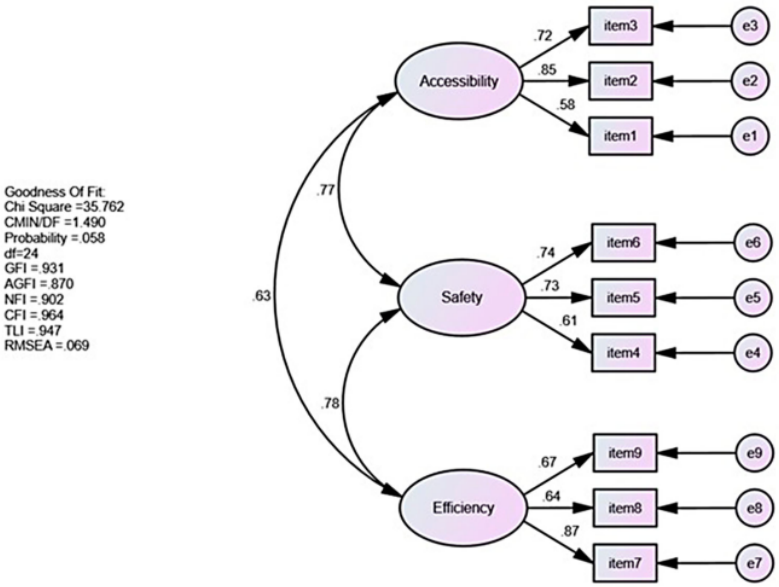

Figure 2. The 3-factor CFA model.

Discussion

The 3 factors related to the information quality of the healthcare information supply chain that supported the performance of physicians for NIDDM management in primary healthcare are accessibility, safety, and efficiency. The factors were shown to be mutually correlated and have no multicollinearity as well as significant value. These factors become fit model. Theme items from these factors become the questions benchmark for a questionnaire. Details of the measuring scale were presented in Table 4.

Based on the results of the goodness of fit test from the formed CFA model, each item in the fit model had a high loading value (0.58–0.87). This model can be used to assess physicians' perceptions of the quality of health information supply chain information in supporting their performance in the chronic disease management program of diabetes mellitus in primary health care services. Several indices were used to

Table 3. Goodness of fit index.

Goodness of fit index	Cut-off value	Analysis results	Model evaluation
Chi-square	It is expected to be less than Chi-Square table with $P = 0.05$ and df = 24, namely amounting to 36.415	35.762	Fit
Probability	> 0.05	0.058	Fit
CMIN/DF	< 2.00	1.490	Fit
GFI	> 0.90	0.931	Fit
AGFI	> 0.90	0.870	Marginal
TLI	≥ 0.95	0.947	Marginal
CFI	≥ 0.95	0.964	Fit
RMSEA	≤ 0.08	0.069	Fit

Table 4. Information quality instrument of healthcare information supply chain for NIDDM management.

No	Construct	Item themes
1.	Accessibility	Ease of access
		Continuity of access
		Fast access
2.	Safety	Confidentiality of medical data and legality
		Reliability
		Early warning
3.	Efficiency	Costs of drugs
		Costs of complications and emergencies
		Costs of care

identify the extent of model fit, making it necessary to select the best-fit index. Models were assessed with Chi-squared fit statistic ($P > 0.05$), comparative fit index (CFI, > 95), Tucker-Lewis Index (TLI, > 0.095), and Root Mean Squared Error of Approximation (RMSEA, < 0.08) [19]. The GFI, AGFI, and CFI values of 0.90 and above indicated excellent conformity, while values between 0.80 and 0.90 showed acceptable conformity. The RMSEA value based on the difference between the model estimation covariance matrix and the sampling covariance matrix, as well as the descriptive fit criterion of less than 0.08, was considered as evidence indicating an acceptable model fit. The scale fit index showed that the model tested in the research had shown a good fit with the data [20].

NIDDM is a chronic disease, which requires chronic disease management for the prevention and cost-effective healthcare delivery [21,22]. The healthcare information supply chain has gained significant importance in recent years. In addition to impacting supply chain performance, links between related parties and an integrated supply chain also help improve patients' health services, leading to greater efficiency and patient safety [23].

Primary healthcare is considered as the basic provider of health services, characterized by preventive, promotive, and limited curative efforts [8,24]. These efforts are highly essential to prevent early complications in patients with NIDDM [25,26]. Physicians as care coordinators in primary healthcare are considered to have an essential role in their performance [8]. Therefore, a continuous medical information supply chain is required to support physicians' performance in NIDDM management in primary healthcare. Each component of continuous care has a supply chain aspect associated with the appropriate level of care [8,14]. This study showed that the NIDDM management program at primary healthcare involved physicians as care coordinators and other health workers in their network units. The main concept of SCM is coordinating and collaborating among supply chain-related parties to achieve system efficiency. Information supply chain coordination and collaboration are concerned with the connection of operations across the chain, with information flowing smoothly across to achieve optimal efficiencies [12,14,23,27].

Medical data documentation in primary healthcare is required to fulfill administrative needs. Meanwhile, the supply of information from medical data in NIDDM management requires continuous access in patients' lifetime [28]. SCM is currently considered to have an important impact in reducing costs and improving performance in healthcare service organizations [11]. NIDDM is a chronic disease that requires the highest treatment costs, including the cost of procuring blood glucose sticks for accuracy in the screening process, and the high burden of the lifelong drug, particularly in patients with the disease [21,22].

Another burden of NIDDM management is the risk of drug side effects associated with inappropriate dose adjustment. The oral antidiabetic drug dose depends on patients' dynamic condition; therefore, lifetime continuous information adjustments are required. A patients' safety guarantee is also needed for physicians and patients to have early warning complication risk information [25]. Technological advances play an important role in diabetes management. Technological advances can assist primary healthcare providers in providing personalized care according to the individual needs of each NIDDM patient [28]. Information technology is closely linked to the success of the healthcare supply chain. Medical information supply should be continuous and real-time accessible by physicians with features that facilitate data interpretation. Easy access to medical information requires a guarantee of confidentiality and legality of medical data [14,29]. This plays an important role in ensuring the safety of physicians to carry out their performance as care coordinators [30].

The validated instrument in this study can be a recommendation for policymakers and stakeholders in primary healthcare. The information quality measurement assesses how well the information supply chain system has supported physicians' performance as a care coordinator. This is important for chronic disease management that involves long-term or lifetime treatments requiring high costs, such as NIDDM. The fit model can be implemented in other primary healthcare outside this research's region with similar characteristics. However, because this study focused on primary healthcare only, the results may not be suitable for extensive healthcare with complex business processes. Although the representativeness of the research sample in Indonesia cannot be claimed directly, the results of processing the Indonesia Social Security Agency of Health sample data (period: 2015–2018) showed that the location (Central Java) is the area with the most NIDDM cases, which is 24.8% (freq: 161.227) compare to 33 other provincial regions.

Conclusions

This study discovered a fit model for assessing healthcare information supply chain quality according to physicians' perceptions of their needs as care coordinators in NIDDM management at primary healthcare. The validated instrument consists of three factors: accessibility, safety, and efficiency. The invariant test demonstrated the goodness of fit test results (GFI = 0.931, CFI = 0.964, RMSEA = 0.069). It is recommended for policymakers and stakeholders to evaluate the healthcare information supply chain

quality from existing systems to support physicians' performance at primary healthcare.

Disclosure statement

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References

[1] Dagogo-Jack S. Diabetes mellitus in developing countries and underserved communities. Dagogo-Jack S, ed. Cham: Springer International Publishing; 2017. doi:10.1007/978-3-319-41559-8

[2] Rachmawati S, Prihhastuti-Puspitasari H, Zairina E. The implementation of a chronic disease management program (Prolanis) in Indonesia: a literature review. J Basic Clin Physiol Pharmacol. 2019;30(6):1–6. doi:10.1515/jbcpp-2019-0350

[3] IDF. International diabetes federation. Vol 102; 2013.

[4] Pham HTK, Kieu TTM, Duong TD, et al. Direct medical costs of diabetes and its complications in Vietnam: a national health insurance database study. Diabetes Res Clin Pract. 2020;162:108051. doi:10.1016/j.diabres.2020.108051

[5] Keck JW, Roper KL, Hieronymus LB, et al. Primary care cluster RCT to increase diabetes prevention program referrals. Am J Prev Med. 2020;59(1):79–87. doi:10.1016/j.amepre.2020.02.008

[6] Puspitasari I, Purwati D, Sinuraya R. Cost-effectiveness analysis of type 2 diabetes mellitus treatment before and after implementing national health insurance program in Babakan sari primary health care Bandung Indonesia: a case study. Value Heal. 2018;21:S39. doi:10.1016/j.jval.2018.07.296

[7] Alkaff FF, Illavi F, Salamah S, et al. The impact of the Indonesian chronic disease management program (PROLANIS) on metabolic control and renal function of type 2 diabetes mellitus patients in primary care setting. J Prim Care Community Health. 2021;12:215013272098440. doi:10.1177/21501327209844409

[8] Werdhani RA, Sulistomo A, Mansyur M, et al. Development of a care coordinator performance measurement tool for Indonesian family physicians.

Eur J Pers Centered Healthc. 2017;5(3):317. doi:10.5750/ejpch.v5i3.1312

[9] Slyngstad L, Helgheim BI. How do different health record systems affect home health care? A cross-sectional study of electronic-versus manual documentation system. Int J Gen Med. 2022;15 (February):1945–1956. doi:10.2147/IJGM.S346366

[10] American Health Information Management Association. AHIMA's long-term care health information practice and documentation guidelines. Published Online; 2014:3.

[11] Christos B, Vicky M, Constantinos SJ. Supply chain management in the healthcare sector: a research agenda. In: Proceedings of the European, Mediterranean and Middle Eastern Conference on Information Systems. 2014: EMCIS; 2014.

[12] Douglas BL. Infonomics. Vol 2. 2018.

[13] Sun S, Yen J. Information supply chain: a unified framework for information-sharing. Lect Notes Comput Sci. 2005;3495:422–428. doi:10.1007/11427995_38

[14] Ledlow GR, Professor F, Manrodt KB, et al. Health care supply chain management elements, operations, and strategies. Burlington, MA: Jones & Bartlett Learning; 2017.

[15] Akhu-Zaheya L, Al-Maaitah R, Bany Hani S. Quality of nursing documentation: paper-based health records versus electronic-based health records. J Clin Nurs. 2018;27(3-4):e578–e589. doi:10.1111/jocn.14097

[16] Almanasreh E, Moles R, Timothy F. Evaluation of methods used for estimating content validity. J Sapharm. 2019;15(2):214–221. doi:10.1016/j.sapharm.2018.03.066

[17] Youseflu S, Shane W, Majid Y, et al. The psychometric properties of the Bergen-Yale Sex addiction scale for the Iranian population. BMC Psychiatry. 2021;21:126. doi:10.1186/s12888-021-03135-z

[18] Ledesma RD, Ferrando PJ, Trógolo MA, et al. Exploratory factor analysis in transportation research: current practices and recommendations. Transp Res Part F Traffic Psychol Behav. 2021;78:340–352. doi:10.1016/j.trf.2021.02.021

[19] Harerimana A, Mtshali NG. Using exploratory and confirmatory factor analysis to understand the role of technology in nursing education. Nurse Educ Today. 2020;92(July 2019):104490. doi:10.1016/j.nedt.2020.104490

[20] Bahadori F, Fazlollah G, Saeideh G, et al. Design and validation of Brucellosis prevention questionnaire focused on animal vaccination. BMC Public Health. 2021;21:2. doi:10.1186/s12889-020-10014-x

[21] Hidayat B, Ramadani RV, Rudijanto A, et al. Direct medical cost of type 2 diabetes mellitus and its associated complications in Indonesia. Value Heal Reg Issues. 2022;28:82–89. doi:10.1016/J.VHRI.2021.04.006

[22] Priyadi A, Permana H, Muhtadi A, et al. Cost-effectiveness analysis of type 2 diabetes mellitus (T2DM) treatment in patients with complications of kidney and peripheral vascular diseases in Indonesia. Healthcare. 2021;9(2):211. doi:10.3390/healthcare9020211

[23] Kritchanchai D, Krichanchai S, Hoeur S, et al. Healthcare supply chain management: macro and micro perspectives. Logforum. 2019;15(4):531–5444. doi:10.17270/J.LOG.2019.371

[24] Putri LP, Mawarni D, Trisnantoro L. Challenges of shifting diabetes mellitus care from secondary- to primary-level care in urban and rural districts: a qualitative inquiry among health providers. J Prim Care Community Health. 2020;11:215013272092421. doi:10.1177/2150132720924214

[25] Ong SE, Jun J, Koh K, et al. Assessing the influence of health systems on type 2 diabetes mellitus awareness, treatment, adherence, and control: a systematic review. PLoS One. 2018;13(3):1–42. doi:10.1371/journal.pone.0195086

[26] Moreno EG, Maider MA, Lourdes O, et al. Efficacy of a self-management education programme on patients with type 2 diabetes in primary care: a randomised controlled trial. Prim Care Diabetes. 2018;13(2):122–133. doi:10.1016/j.pcd

[27] Hugos M. Essentials of supply chain management. Canada: John Wiley & Sons, Inc.; 2018. doi:10.1002/9781119464495

[28] Bode B, Aaron K, David R, et al. Leveraging advances in diabetes technologies in primary care: a narrative review. Ann Med 2021;53(1):805–816. doi:10.1080/07853890.2021.1931427

[29] Chen HY, Wu ZY, Chen TL, et al. Security privacy and policy for cryptographic based electronic medical information system. Sensors (Switzerland). 2021;21(3):713–714. doi:10.3390/s21030713

[30] Hs BD. Legal aspect of patient's medical record. In: Proceedings of the International Conference on Law Reform (INCLAR 2019). Vol 121. Atlantis Press; 2020. p. 76–79. doi:10.2991/aebmr.k.200226.015

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