

Interprofessional Collaboration in the Management of Type 2 Diabetes Mellitus: A View from Central Java, Indonesia

Siti Ma'rufah^{1,2}, Satibi³, Nanang M Yasin³, Susi A Kristina³

¹*Doctoral Program, Faculty of Pharmacy, Gadjah Mada University, Yogyakarta, 55281, Indonesia*

²*Department of Pharmacology, Faculty of Medicine, Sebelas Maret University, Surakarta, 57126, Indonesia.*

³*Department of Pharmaceutics, Faculty of Pharmacy, Gadjah Mada University, Yogyakarta, 55281, Indonesia*

Email: satibi@ugm.ac.id

Diabetes type 2 management is complicated and requires long-term strategies involving many health professionals. It is frequently associated with various complications and comorbidities that necessitate specialized care. Interprofessional collaboration (IPC) is essential in diabetes mellitus management, particularly for inpatients who are frequently more acutely ill or have multiple health issues simultaneously. Indonesia is a developing country, and IPC implementation could be better. This study aims to look at the perspective of IPC health professionals, how IPC is used to manage type 2 diabetes patients in Indonesia, and to identify barriers and facilitators. A mixed-methods design with qualitative and quantitative approaches was used in this study. There were two stages of data collection. Three hundred ninety-eight health professionals were in the first stage, and a Focus Group Discussion (FGD) was conducted with 45 respondents. The quantitative data were analyzed via descriptive and inferential analysis, and Two of the present authors independently performed a thematic analysis on the verbatim transcriptions of the FGDs. The result showed no significant differences in total Collaborative Practice Assessment Tool scores by age group, education, length of work, and sex. The CPAT scores of the total respondents range from 53 to 318, with a median score of 259. Healthcare providers generally collaborate with all Diabetes patients, simple and complicated, using integrated patient progress

records on electronic or hardcopy medical records. The study concludes that IPC in type 2 Diabetes Mellitus patients had not been carried out optimally. IPCs still have different services for patients with complications and non-complications.

Keywords: CPAT, Interprofessional relations, FGD.

1. Introduction

Type 2 Diabetes Mellitus (DMT2) is one of the most common chronic diseases worldwide, with an increasing burden in developing countries (Who, 2023). The rise in Type 2 DM cases can be attributed to various factors. Rapid urbanization refers to rapidly growing cities in population and infrastructure, often resulting in lifestyle changes such as less physical activity and unhealthy diets. Poor dietary habits or sedentary behavior are examples of lifestyle changes. The term "population aging" refers to an increase in the proportion of older people predisposed to diseases such as diabetes. Diabetes prevention, early detection, and management may be compromised due to insufficient healthcare systems (El-Kebbi et al., 2021; M. A. B. Khan et al., 2020; Kyrou et al., 2020).

Diabetes management is complex and necessitates long-term strategies involving various health professionals (American et al., 2016; Hood et al., 2015; Sørensen et al., 2020). It often comes with various complications and comorbidities that require specialized care. IPC (IPC) is so important in the management of diabetes mellitus, especially for inpatients who are frequently more acutely ill or have multiple health issues at the same time (Nurchis et al., 2022; Szafran et al., 2019; Torti et al., 2022a).

Interprofessional collaboration (IPC) refers to various healthcare professionals working together to provide the best patient-centered care possible (Gantayet-Mathur et al., 2022; Van Dongen et al., 2016). Here is a breakdown of the roles that work together: endocrinologists or diabetologists, dietitians or nutritionists, nurses or certified diabetes educators, pharmacists, and Physical Therapists (Lee et al., 2021; Nurchis et al., 2022; Torti et al., 2022). It is increasingly recognized as critical for managing chronic diseases such as diabetes due to its multifaceted nature, necessitating medical, lifestyle, and psychosocial interventions (Adu et al., 2019; Grady & Gough, 2014; Powers et al., 2020).

However, IPC faces unique challenges in developing countries, such as limited resources (Bosire et al., 2021), a lack of professional training in collaborative practice, and socio-cultural barriers (Green & Johnson, 2015). These obstacles may limit the effectiveness of IPC, resulting in suboptimal DM management outcomes (Bosire et al., n.d., 2021; Dankoly, 2021).

This Journal investigates the perspective of IPC health professionals, how IPC is implemented in managing type 2 DM patients in developing countries, and identifies barriers and facilitators. Understanding these aspects can help optimize interprofessional collaborative practices not only for diabetes management but also for other chronic disease management in resource-constrained settings.

2. Subjects and Methods

The research was conducted at five hospitals in central Java (the teaching hospital of Moewardi Surakarta, the hospital of PKU Muhammadiyah Surakarta, the hospital of PKU Muhammadiyah Karanganyar, the hospital of Bung Karno Surakarta, and the teaching hospital of Universitas Sebelas Maret) (UNS). This study used a mixed-methods approach that included both qualitative and quantitative approaches. There were two stages of data collection: 1) administration of the Indonesian Collaborative Practice Assessment Tool (CPAT) to assess the levels of collaboration according to the health profession's perceptions, and 2) focus group discussion (FGD) to explore further participants' perceptions on current collaborative practice in their work setting, as well as its supporting and inhibiting factors IPC in DMT2.

Health professionals from the five hospitals comprise the sample population. Because the hospital still has a limited number of health professionals, total population sampling was used to recruit all respondents who met the inclusion criteria (i.e., health professionals with experience with IPC service Diabetes mellitus). The Hosmer-Lemeshow formula was used to calculate the minimum number of samples with an unknown population ($P = 0.5$), Z value $p0.05$ of 1.96, and absolute precision of 0.2, yielding a sample size of 24 respondents. Three hundred ninety-eight health professionals were invited to participate in this study's first stage.

$$n=(Z^2 P (1-P))/d^2$$

FGDs were held with 45 respondents who had completed the CPAT to achieve data saturation. The FGD participants were divided into six groups: six for Internal Medicine Specialists, three for psychiatric specialists, two for specialist Nutrition Clinic, twelve for pharmacists, twelve for nurses, and ten for nutritionists. The FGD participant grouping could have been more professional to provide a more conducive environment for expressing opinions.

The CPAT comprises 53 items scored on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree." The Indonesian CPAT differs slightly from the original version in that it has eight domains. Among the domains are relationships among team members, barriers to collaboration, community team relationships, role distribution and coordination, decision-making and conflict resolution, leadership, mission, goals, objectives, patient involvement, responsibility, and autonomy

The authors created the questions for FGD and patient satisfaction, and the content has been validated. The questions for patients to identify T2DM patient satisfaction with implementing inpatient services at the hospital sought to ascertain whether and to what extent collaborative practice exists, its perceived importance and benefits, and the factors that support and inhibit it.

IBM SPSS Statistics 23 was used to analyze the quantitative data for descriptive and inferential purposes. The distribution of scores and the differences in mean scores between groups were computed. Two present authors independently conducted a thematic analysis on the FGD verbatim transcriptions. The first step was to examine two random transcripts. Members of the research team then discussed the emerging themes and subthemes. After

reaching an agreement, the remaining transcripts about the themes and subthemes were analyzed. The results now include newly emerging themes and sub-themes.

The Health Research Ethics Committee of the Medicine Faculty of the University of Sebelas Maret approved the study (number: 11/UN27.06.11/KEP/EC/2023). Pseudonyms are used in reports containing qualitative and quantitative data because all data was collected anonymously. All data is kept secure by the authors.

3. Results

1. Interprofessional Collaborative Practice Level

Three hundred ninety-eight health professionals completed the CPAT. Table 1 depicts the demographic breakdown of respondents. Many hospitals are between 20 and 30 years old (32.90 percent). 86.7 percent are female, and 32.7 percent are nurses. Most respondents (54,02 percent) had worked in a hospital for less than ten years. The data were examined for normality using the Kolmogorov-Smirnov test, which revealed an abnormal distribution; thus, CPAT scores are represented by median values. The Indonesian version of the CPAT questionnaire was validated using a 53-item CPAT, demonstrating internal consistency with a Cronbach's alpha coefficient of 0.916 overall (Yusra et al., 2019). The CPAT scores of the total respondents range from 53 to 318, with a median of 259. There are no specific guidelines or classifications for interpreting the CPAT score.

According to the Kruskal-Wallis and Mann-Whitney tests, there were no significant differences in total CPAT scores by age group, education, length of work experience, sex, length of IPC, position in IPC, or placement of IPC. Age differences in team member relationships, team-society relations, coordination and task division, decision-making, and conflict resolution were discovered in a post-hoc analysis. The length of work varies greatly depending on team barriers in collaboration, community relations, task coordination and distribution, and leadership. Position on collaboration as a team leader or member, community relationships, and leadership. A collaborative environment with task coordination and division. Tables 2-4 show the post-hoc results.

Table 1. Demographic distribution of health workers (n=398)

Category	Subcategories	Number (people)	Percent (%)
Age	20-30 years	131	32.9
	31-40 years	113	28.4
	41-50 years	95	23.9
	51-60 years	59	14.8
Sex	Man	53	13.3
	Woman	345	86.7
Profession	Doctor / Specialist	52	13.1
	Health analyst	38	9.5
	Public health expert	6	1.5
	Nurse	130	32.7
	Pharmacist	50	12.6
	Midwife	26	6.5
	Psychologist	3	0.8
	Physiotherapy	11	2.8
	Nutritionist	8	2.0
	Others (pharmaceutical technical personnel, education team)	74	18.6

Length of work	0-5 years	127	31.9
	6-10 years	56	14.1
	> 10 years	215	54

Table 2. Median (minimum-maximum) CPAT score and Post hoc analysis results by age and gender

Component	Age (years)				Kruskal Wallis	Sex Median (min-Max)		Mann Whitney
	Median (min-Max)					Man	Woman	
	20-30	31-40	41-50	51-60				
Total score	258(53-318)	260(53-318)	261(53-318)	258(53-299)	0.325	258(53-306)	259(53-318)	0.557
Relationships between members	46(9-54)	47(9-54)	49(9-54)	45(9-54)	0.012	45(9-54)	47(9-54)	0.470
Team barriers to collaboration	17(5-25)	17(5-30)	17(5-30)	17(5-30)	0.073	17(5-30)	17(5-30)	0.700
Team-to-community relationship	20(0-24)	20(4-24)	20(4-24)	20(4-24)	0.003	20(4-24)	20(0-24)	0.602
Coordination and division of tasks	70(14-84)	70(14-84)	70(14-84)	70(14-84)	0.028	70(14-84)	70(14-84)	0.727
Decision-making and conflict management	10(2-12)	10(2-12)	10(2-12)	10(2-12)	0.010	10(2-12)	10(2-12)	0.116
Leadership	25(5-30)	25(5-30)	25(5-30)	25(5-30)	0.259	25(5-30)	25(5-30)	0.602
Mission, goals, and objectives	45(9-54)	45(9-54)	45(9-54)	45(9-54)	0.418	45(9-54)	45(9-54)	0.834
Patient engagement	25(5-30)	25(5-30)	25(5-30)	25(5-30)	0.139	25(5-30)	25(5-30)	0.672

Table 3. Median (minimum-maximum) CPAT score and Post hoc analysis results by profession

Component	Profession Median (min-Max)										Kruskal Wallis
	Doctor / Specialist	Health analyst	Public health experts	Nurse	Pharmacist	Midwife	Psychologist	Physiotherapy	nutritionist	Other	
Total score	259(53-307)	258.5(53-316)	259(250-287)	261(53-318)	257.5(53-292)	261.3(242-309)	268(264-291)	259(253-300)	259(247-268)	257.5(53-303)	0.293
Relationships between members	50(9-54)	46,5(9-54)	49(45-54)	48(9-54)	46(9-54)	47(41-54)	46(45-54)	50(45-54)	46(45-50)	45(9-54)	0.043
Team barriers to collaboration	17(5-30)	17,5(5-30)	17(10-20)	17(5-30)	16(5-28)	18,5(13-27)	16(6-17)	16(10-30)	18,5(15-19)	17(5-29)	0.020
Team-to-community relationship	20(4-24)	20(4-24)	20(19-23)	20(4-24)	20(0-24)	20(17-24)	21(20-24)	20(20-24)	20(15-22)	20(4-24)	0.098
Coordination and division of tasks	70,5(14-84)	70(14-84)	73(68-79)	70(14-84)	70(14-84)	71(62-84)	72(70-84)	70(70-84)	70(63-76)	70(14-84)	0.022
Decision-making and conflict management	10(2-12)	10(2-12)	10(6-12)	10(2-12)	10(2-12)	10(6-12)	10(10-12)	10(6-12)	10(9-11)	10(2-12)	0.646
Leadership	25(5-30)	25(5-30)	25(24-28)	25(5-30)	25(5-30)	25(19-30)	26(25-29)	25(25-30)	25(24-27)	25(5-30)	0.126
Mission, goals, and objectives	45(9-54)	45(9-54)	45,5(44-54)	45(9-54)	45(9-54)	45(41-54)	54(45-54)	54(45-54)	45(43-45)	45(9-45)	0.168
Patient engagement	25(5-30)	25(5-30)	24(20-30)	25(5-30)	25(5-30)	25(19-30)	25(25-30)	25(23-30)	25(23-25)	25(5-30)	0.350

Table 4. Median (minimum-maximum) CPAT score and Post hoc analysis results based on length of work

Component	Length of work Median (min-Max)			Kruskal Wallis
	0-5 years	6-10 years	>10 years	
Total score	258(53-318)	258(53-316)	260(53-318)	0.215
Relationships between members	46(9-54)	48(9-54)	47(9-54)	0.134
Team barriers to collaboration	17(5-30)	17,5(5-30)	17(5-30)	0.015
Team-to-community relationship	20(4-24)	20(0-24)	20(4-24)	0.000
Coordination and division of tasks	70(14-84)	70(14-84)	70(14-84)	0.021
Decision-making and conflict management	10(2-12)	10(2-12)	10(2-12)	0.184
Leadership	25(5-30)	25(5-30)	25(5-30)	0.019
Mission, goals, and objectives	45(9-54)	45(9-54)	45(9-54)	0.153
Patient engagement	24,5(5-30)	25(5-30)	25(5-30)	0.063

Table 5. Characteristics of FGD informants

FGDs	Internal Medicine Specialist	Clinical nutritionist	Psychiatrist	Pharmacist	Nurse	Nutritionist
Sex						
Man	3		2	1	2	1
Woman	3	2	1	11	10	9
Age						
20-30 years				7	6	6
31-40 years	4	1		3	5	1
41-50 years	2	1	3	2		2
51-60 years					1	1
Education						
Diploma					4	1
Bachelor				9	8	9
Postgraduate	5	2	3	3		
Doctoral	1					

2. Collaborative practice models

The focus group participants were diverse people in age, gender, profession, and years of work experience. Table 5 displays the emerging themes from six focus groups. All of the themes describe how hospital staff perceived the IPC. The results of the focus groups are shown in Appendix 1. The number of mentions, in the opinion of the respondents, represents the importance of the subthemes

As evidenced by the eight comments below, most respondents consider IPC a comprehensive approach involving various health workers collaborating to expedite patient recovery. Collaboration has been used in various hospital settings, including emergency departments, outpatient clinics, inpatient and operating rooms, and community-based activities such as home care. This phenomenon is described in the comments below.

The service model for type 2 diabetes patients in hospital inpatient wards varies according to the facility and hospital policies. In general, healthcare providers collaborate with all DMT2 patients, simple and complex, by using integrated patient progress records on electronic medical records (ERM) or hardcopy medical records. Health professionals such as doctors, nurses, pharmacists, and nutritionists conducted the visit. Each health worker performs the current visit individually, as well as in patients who have complications. Case conferences are only held for inpatients with complications or patients, families, or patients accompanying them. A case manager can provide joint care and a round of joint care in person, over the phone, or via WhatsApp. After being discharged from the hospital, patients

are educated, either through the WA group or through the implementation of gymnastics and blood checks.

3. Advantages of Collaborative Practice

IPC implementation benefits both patients and healthcare workers. The patient benefits from faster recovery, higher quality of life, better prognosis, and shorter hospitalization. Science, time management, and budgeting are all improved by health workers.

4. Factor support the collaborative practice.

A detailed policy brief, drug monitoring and evaluation, caregivers, and support from hospital administration in funding and policy are all supporters of management activities for DMT2 patients in Indonesian hospitals.

5. Factors inhibiting the collaborative practice

The egoism of each profession, time, limited human resources, patient financing system, communication between health workers, reward health workers, and policy briefs inhibit implementing IPC in DMT2 management.

4. Discussion

The perception of health workers in implementing IPC in hospitals with CPAT demonstrates that the participants are diverse regarding their health professional backgrounds, age, and length of employment. The diverse backgrounds of health workers enable each field's contribution to health services and professional collaboration to be even more significant, increasing integration (stronger connections), divergence (looser connections), and improving service quality (Heip et al., 2022; Schot et al., 2020).

Work duration varies greatly depending on team barriers in collaboration, public relations, task coordination and distribution, and leadership. Because older healthcare workers have more work experience, they are more familiar with collaborative practices. They may have improved their communication and teamwork abilities as they advance. It is consistent with Yusra's research, which found that age and length of work are related to the value of collaboration (Yusra et al., 2019). In the study (Herawati et al., 2021; Kusuma et al., 2021), age is related, but length of work is not. Anum's study comparing IPC with primary care practices in Ontario (Family et al. [FHT] and Community Health Centers [CHC]) found no relationship between age and length of work in the value of collaboration (A. I. Khan et al., 2022; Soemantri et al., 2022).

The implementation of IPC in type 2 DM inpatients in Central Java hospitals is nearly identical. In general, collaboration between health workers has been implemented in all DMT2 cases through writing integrated patient development records, either on electronic medical records (ERM) or hardcopy medical records. The study is consistent with research conducted by (Soemantri et al., 2019). Regulations, policies, resources, cooperative culture, organizational structure, facilities, and technology impact IPC implementation.

1. Policies and Regulations

International, national, and regional regulations and policies can all impact how IPC is implemented in hospitals. The government and colleges regulate Health professionals, associations, and hospitals (Szafran et al., 2018). The World Health Organization (WHO) has recommended implementing IPC in health services ((World Health Organization, 2010). IPC policies are established in various parts of the world, including high-income countries (the United States and Canada), low-income countries (South et al.), lower-middle-income countries (China and the Middle East), and upper-middle-income countries (Eiff et al., 2020; Walker et al., 2014). The Indonesian government has implemented IPC in health services through health worker regulations, hospital accreditation, and patient-centered and integrated quality health service standards (Kementerian Kesehatan RI, 2022). However, in the implementation of the IPC's objectives, there are unclear legislation, conflicting legislation, protection practice, and a lack of knowledge about the role of other health professions, demonstrating that no single sector (whether health, education, regulation, or government) can address this in isolation. To be more specific, broader collaboration across sectors, rather than just at the same level of government or regulatory authority, is required to overcome barriers to achieving IPC policy objectives (Regan et al., 2015).

2. Human Resources

The availability of resources (time and workforce) can also affect the IPC model's successful implementation. IPC (IPC) is a method of delivering patient care that involves multiple health professional disciplines working together. Several obstacles can arise regarding human resources, including the number of health workers needing to be more optimal (Badan Pusat Statistik, 2018), which impacts the lack of time and being too busy with their tasks, making collaborating with other team members challenging. Because healthcare workers are not educated or trained in how to work effectively in interprofessional teams, they may be unaware of the roles and responsibilities of other team members. Education has a positive impact on health workers' perceptions of interprofessional and teamwork (Flores-Sandoval et al., 2021; Mink et al., 2021), personal relationship development, education improvement, patient care improvement (Carney et al., 2019; Flores-Sandoval et al., 2021) that prevents adverse events (Despins, 2009; Manser, 2009; Rose, 2011), communication skills improvement (Carney et al., 2019).

There is often a hierarchy among health professionals (e.g., doctors are often considered to be at the top of the hierarchy). Stifle collaboration if team members believe their voices are ignored or undervalued(Lackie & Tomblin Murphy, 2020; Stucky et al., 2022). Professionals involved in collaborative activities have yet to receive verbal such as financial bonuses, additional benefits, extra vacation time, or promotions as a form of motivation and reward for their contributions to successful collaborative practice(Bashatah et al., 2020; Bawab et al., 2023; Bondi et al., 2023; Moncatar et al., 2021; Oosterhouse et al., 2023; Wittenberg & Barnhart, 2021).

3. Organizational structure and culture

IPC in an organization is heavily influenced by organizational structure (Busari et al., 2017). A clear organizational structure will define the roles and responsibilities of each team

member. Communication typically flows from top to bottom in a hierarchical structure, whereas communication can be more horizontal in flatter structures (Busari et al., 2017; Claramita et al., 2019; B. Green et al., 2017; Salehi et al., 2020; Sjögren Forss et al., 2021).

Organizational structure has an impact on how decisions are made. Senior management typically makes critical decisions in the top-down model, whereas decisions in participatory or collaborative models may be made through consensus or group discussion. The degree to which team members cooperate can be influenced by organizational structure (B. N. Green & Johnson, 2015).

The type of leadership used in an organization is also crucial in fostering IPC by cultivating a culture of cooperation and mutual respect among professionals (Folkman et al., 2019; Hu & Broome, 2020; Kurniasih et al., 2022; Montano, 2021; Smith et al., 2018; Stucky et al., 2022). Participatory and inclusive supportive leadership fosters more cooperation than authoritarian or top-down leadership styles.

Values and norms within an organization can help or hinder IPC. If values like cooperation, mutual respect, and open communication are emphasized, team members from different disciplines are more likely to work effectively together (Hindhede & Andersen, 2021; Ingels et al., 2023; Mossberg, 2014; Stalmeijer, 2021; Zielińska-Tomczak et al., 2021). Trust and respect: A culture where mutual trust and respect are valued will strengthen IPC because each individual feels that his or her opinion is listened to and valued by others from different professions (Ansa et al., 2020; Flood et al., 2022; J. M. Johnson et al., 2021; Stadick, 2020; Vatn & Dahl, 2022; Zielińska-Tomczak et al., 2021).

A cooperative culture encourages better and more open communication among team members from various professional disciplines. Ensures all team members understand the common goal and how they can contribute to its achievement (Opele et al., 2020; Runtu et al., 2019; Sillero & Buil, 2021; Stucky et al., 2022). Roles and responsibilities are more evenly distributed among team members, each contributing according to their skill set. There can be improved efficiency and effectiveness in achieving goals (Keshmiri & Barghi, 2021; Notko et al., 2022; Vaseghi et al., 2022). Conflicts in a team can be resolved more effectively and constructively when there is a shared understanding that the goal is to find the best solution for the entire team or organization (Ugirase, 2022).

4. Facilities and technology

A comfortable and safe working environment can also enhance IPC. If team members feel comfortable in their workspace, they are more likely to actively engage in discussions and other team activities (O'Donnell et al., 2023; Rotundo et al., 2022; Van Staalduinen et al., 2023). Communication facilities like teleconferencing systems or project management software are also essential for facilitating communication and coordination among team members who might be working at different locations or have differing schedules (Hafford-Letchfield et al., 2018; K. F. Johnson, n.d.; Miller et al., 2020; Ohta et al., 2020; Wong et al., 2021). The program improved the emergency management process and reliability among interprofessional practitioners, positively impacting IPC and ensuring the safety of patients during emergencies (Choi et al., 2021).

The study concludes that IPC in type 2 DM patients has yet to be successful because there

are still differences in services for type 2 DM patients with complications and non-complications. Male and female patients have significantly different levels of satisfaction.

The researchers did not categorize the perception of health workers or the IPC service model of type 2 DM patients based on the classification of type A, B, C, and D according to regulation because the perception of health workers can be influenced by hospital policy support, availability of health workers, facilities, structure, and organizational culture of each hospital.

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