How common are Chinese patients with multimorbidity involved in decision making and having a treatment plan? a cross-sectional study

Kam Pui Lee (lkp032@cuhk.edu.hk)  Chinese University of Hong Kong  https://orcid.org/0000-0001-8267-9384
Samuel Yeung Shan Wong  Chinese University of Hong Kong
Benjamin Hon Kei Yip  Chinese University of Hong Kong
Eliza Lai Yi Wong  Chinese University of Hong Kong
Dicken Chan  Chinese University of Hong Kong
Patsy Chau  Chinese University of Hong Kong
Lawrence Luk  Chinese University of Hong Kong
Eng-kiong Yeoh  Chinese University of Hong Kong

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Abstract

Background Creating a treatment plan (TP) through shared decision making (SDM) with healthcare professionals, is of paramount importance for patients with multimorbidity. This study aims to estimate the prevalence of SDM and TP in patients with multimorbidity, and study the association between SDM/TP with demographics and patients’ confidence to manage their diseases. Method This cross-sectional study used an internationally recognized survey. 1,032 patients aged 60 or above with multimorbidity, were recruited from a specialist outpatient clinic, general outpatient clinic (GOPC) and a geriatric day hospital. The proportion of patients reported to have SDM and TP were estimated. Associations between the presence of SDM/TP and patients’ demographic data, and the confidence level to manage their illnesses, were then studied using logistic regression. Results The prevalence of SDM and TP were 35.8% and 82.1%, respectively. The presence of TP was associated with receiving healthcare from the same doctor or in the same facilities, and being recruited from GOPC. Presence of SDM (OR 1.381, p=0.054) and TP (OR 2.195, p<0.0001) were associated with enhanced confidence in dealing with diseases. Conclusion Most people with multimorbidity had TP in Hong Kong, but fewer patients had SDM.

Practice implications: Ways to promote SDM in HK are needed.

Background

Multimorbidity (MM) is commonly defined as the ‘co-existence of two or more chronic conditions, where neither is more central than the others’\(^1\). MM is common especially in the older and socioeconomically deprived populations\(^2,3\). A study involving a large database found that approximately 65% of patients older than 65 years old had MM\(^3\). MM is associated with mortality, disability, impaired quality of life, psychological distress, and increased health care utilization\(^4,5\).

Despite the fact that much is known about the consequences of MM, there remains a lack of evidence underpinning the management of MM, because randomized controlled trials typically exclude patients with MM and the resultant clinical guidelines are disease-focused and rarely deal with MM\(^6,7\). Managing patients with MM by strictly following these guidelines can overburden patients with MM with too many visits to healthcare professionals, excessive and conflicting lifestyle advice and prescription of medications\(^7–14\). Therefore, instead of following clinical guidelines, the American Geriatric Society\(^15\) and The National Institute for Health and Care Excellence (NICE)\(^16\) recommended a shared decision process to individualize a treatment plan that is in accordance with patients’ preferences and values, and this may minimize treatment burden and maximize quality of life. Shared decision making (SDM) is defined as ‘an approach in which the clinician and patient go through all phases of the decision making process together and in which they share the preference for treatment and reach an agreement on treatment choice’; this is in contrast to the traditional medical model where doctors are solely responsible for prescribing the ‘best’ treatment to patients\(^17\). Creating treatment plans (TP) by SDM has been shown to enhance patients’ sense of control over their illness, improve their symptoms, enhance their knowledge and reduce concerns towards illnesses; which in turn, can enhance adherence to medications and improve quality of life\(^17,18\). While there were previous studies in Hong Kong investigating SDM in other patient populations, including do-not-resuscitate decisions in patients with chronic obstructive lung diseases and in surgical and medical patients\(^19,20\), the prevalence of SDM and TP in patients with MM, who could benefit most from SDM in Hong Kong, was not previously known.

The primary aim of this study was to determine the proportion of patients with MM who reported having SDM and/or a TP. As a secondary objective, participants were asked how confident they were to manage their illnesses. The relationships between the presence of SDM and/or a TP and their confidence level to manage their illnesses, were delineated. We hypothesized that a high proportion of patients with MM had SDM and/or a TP and having these could enhance their confidence in disease management.

Methods

This cross-sectional study utilized an internationally recognized survey (see below). 1,032 patients were recruited, who (i) were aged 60 or above, and (ii) who self-reported to have at least three chronic conditions (appendix 1). Patients were recruited at one General outpatient clinics (GOPCs), one geriatric specialist outpatient clinic (SOPC) and/or geriatric day hospital (GDH) in each of the seven HA clusters, from June 2016 to July 2017. We included patients only older than 60 years old because MM is most common in the older population. Besides, all patients in GDH and SOPC were older than 60 years old. While Hong Kong has a dual healthcare system where patients can choose to obtain healthcare from both private and the public sector, the vast majority of patients with chronic diseases were seen under the Hospital Authority system, where the current study was conducted\(^21\).

The questions used in the current research were extracted from the International Health Policy Survey of Older Adults, which was used previously in multinational research involving 11 countries and more than 15,000 participants\(^22\). The instrument consists of questions to estimate or understand health care costs and access, doctor-patient relationships, health promotion, management of chronic conditions, and caregiving\(^22\). The survey has been used in various other large-scale research projects\(^23\). Questions about (i) whether participants had a SDM and TP, and (ii) whether they had a regular doctor/organization for their chronic disease, were extracted. The survey was translated and validated by iterative forward-backward translation, and cognitive debriefing interviews in Hong Kong\(^24\). After the questionnaire was piloted, a few questions were added by the expert panel, which consisted of three clinical and social experts involved in the care of elderly, each possessing at least 10 years working experience. These
additional questions were aimed to fine-tune the instrument to fit the local cultural context. Demographics including number of chronic illnesses, sex, education level, marital status, family income, financial income sources (social allowance Comprehensive Social Security Assistance (CSSA) signifies disadvantages financially), regular healthcare provider for participants’ chronic illness and whether the participant had health insurance, were collected. Written consent were obtained from all participants before their participation of the project.

- **Statistical analysis**

The demographic characteristics of the study participants were summarized as count and percentage. The outcomes were collected by 4-option items in the questionnaire, and were simplified into 2 levels (Always/Often and Sometimes/Rare/Never) to facilitate their analysis and interpretation of the results. The proportion of patients who were involved in components of SDM and TP, as well as confidence in managing their chronic conditions, were presented. Logistic regression was constructed to study the relationship between various demographic data and the presence of shared decision making process, treatment plan and confidence in managing chronic disease. Variables set at p-value < 0.1 in the initial univariate analyses, were entered into the forward stepwise multivariate model to determine the most significant associations. The associations between the presence of shared decision process and treatment plan and patients’ confidence in managing chronic disease, were also studied using logistic regression. Odds ratio (OR) and 95% confidence interval (CI) were estimated to clarify the strength of association, and the significance is considered a two-sided P < 0.05. Statistical analyses were conducted using IBM SPSS Statistics 21.

The percentages of missing data for three primary outcomes were lower that 6%. Missing data was assumed to be missing at random (MAR), therefore our analysis was based on complete cases only. No characteristics differences were found between subjects with and without missing values.

- **Sample size**

Due to a lack of previous similar studies, at a precision of 3.1% and a presumed prevalence of 50% of patients with MM who received shared decision making (which required the largest possible sample size), the required sample was determined to be 1,000 participants. Therefore, our sample size was considered adequate.

**Results**

**Participants**

The number of patients approached was 2,331 and the number of patients participated and completed the questionnaire was 1,032. The response rate was 44.3%. More than one-third of our participants were older than 80 years old. Around half of them were male (53.5%) and most participants received some level of education (80.9%), were married (67.4%), had family income below $6,000 (61.7%), had three to four diseases (60.9%) and no health insurance (90.9%). Around 17% were receiving comprehensive social security assistance (CSSA). The vast majority (92.2%) reported that they had a regular health care facility to visit, but only 28.3% reported that they had a regular doctor (Table1).

The percentage of missing data for primary outcomes: “Deciding a treatment according to your will and get you involved” was (952-897)/952=5.7%; “Do you have a treatment plan for your chronic conditions” was (1032-1025)/1032=0.6%; “How confident are you that you can control and manage your health problems” was (1032-1019)/1032=1.3%.

**Proportion of presence of shared decision making and a treatment plan (table 1)**

Only 35.8% of participants reported that their TPs were decided according to their own preferences or were involved in making it but 82.1% of participants reported the presence of a TP.

The proportion of presence of important components to shared decision making varied: 91.2% of participants believed that their doctors know their medical information; 72.2% felt that the consultation time was enough; 27.8% reported that their doctors encourage questions; 74.8% reported that explanation was easily understandable; 22.8% participants recalled that their doctor once discussed with them about their priorities and goals; and 27.4% reported that alternative treatments were discussed. Most participants (72.4%) felt the TP, when present, helped them to manage their chronic conditions. (appendix 2)

**Factors associated with the presence of shared decision making and a treatment plan**
The presence of the SDM process was not associated with any demographic data, including age, sex, marital status, the presence of health insurance or a regular doctor, number of diseases and where they received their follow-up (table 2), thus the multivariate model for SDM was not applicable. In the univariate model, the presence of a TP was more likely if the participants reported a regular doctor/facilities (OR=2.203; p = 0.004), if the patient was recruited in GOPCs (SOPC: OR=0.538, p=0.009; GDH: OR=0.554, p=0.001) and if the patient received education up to secondary school level (OR 1.569; p =0.049); conversely, treatment plan was less common in participants aged 80-84 (OR=0.429; p=0.010) (table 2). In the forward logistic model, only having follow-up by a regular doctor or in a regular facilities (OR=1.980; p=0.013) and being recruited in a GOPC (SOPC: OR=0.608, p=0.041; GDH: OR=0.585, p=0.003) remained significant predictors for the presence of a treatment plan (table 3). Again, the number of diseases did not affect the presence of shared decision making or a presence of treatment plan. (table 2)

Similar analysis was conducted for other components of the SDM process. In the multivariate models, participants whose monthly family income more than $30,000 were more likely to be offered alternative treatments (OR=2.718, p=0.008), those with monthly family income between $0-$6000 were more likely to be discussed with their goals or priorities (OR=3.196, p=0.001) and given instructions about symptoms and further care (OR=2.012, p=0.004), as well as those with monthly family income was $6000-$17999 (OR=2.398, p=0.025; OR=2.124, p=0.007); patients who had more than 6 chronic diseases were more likely to be given clear instructions about symptoms and care (OR=2.121, p=0.007), but less likely to have things explained to them in an easy to understand manner (OR=0.439, p<0.0001); patients with regular doctors were more likely to report that the doctor know important medical information (OR=2.406; p=0.021) and that they were encouraged to ask questions (OR=1.387, p=0.037); participants who were recruited in GDH were more likely to be encouraged to ask questions (OR=1.440, OR=0.022), but less likely to have the doctor know important medical information (OR=0.138, p<0.0001), spend enough time with them (OR=0.585, p=0.013), explain things clearly (OR=0.628, p=0.008), and they had less confidence about their own treatment plan (OR=0.491, p<0.0001).

Association between presence of shared decision making/treatment plan and patients’ confidence to manage disease

Overall, a quarter of participants (25%) felt not confident enough to manage their health problems (Table 1). Lack of confidence was associated with larger number of diseases being a female, low education attainment, being recruited from SOPC or GDH, and lack of health insurance (Table 2). In the forward stepwise multivariate model, lower educations, having more than 6 chronic diseases, and being recruited from SOPC or GDH remained significant predictors for lower confidence to manage health problems (table 3). The presence of a treatment plan enhanced patients’ confidence to handle their illnesses (OR=2.503; 95%CI: 1.715, 3.653) in the multivariate logistic regression model (Table 4); the presence of a shared decision making process also enhanced patients’ confidence (OR=1.298), however it was not statistically significant (p=0.126).

Discussion

This is one of the first studies that explores the prevalence of SDM and presence of TP in Chinese patients with multimorbidity, which showed that the presence of SDM and/or TP were associated with enhanced patients’ confidence to manage their illnesses. Previous similar studies involved Chinese patients with breast cancer and found inconclusive results. One study revealed that 70% of patients were allowed to decide their preferred surgery25; but a second study mentioned that the level of shared decision making in which these patients were engaged was low, according to a validated scale using direct observations of the actual consultations26. In the current study, the majority (82.1%) of participants were aware of a TP, but only around one-third of participants recalled having an SDM process in which their priorities and preferences were taken into consideration to build the TP. It was likely that TPs were prescribed by doctors rather than as a product of discussion with patients. Nevertheless, both the presence of shared decision making (OR 1.381, p =0.054) and treatment plan (OR 2. 195, p<0.0001) appeared to enhance participants’ confidence to manage their illnesses. Participants who were recruited from primary care clinics (GOPC) were more likely to have a treatment plan (especially those reported having a regular doctor/having follow-up in a regular facility) and were more confident to handle their diseases, even after being controlled for the number of diseases. This may be because primary care doctors were trained to provide continuous and comprehensive patient care, and therefore are more likely to formulate a TP that patients can recall27.

SDM was reported only infrequently in our sample, despite its internationally-recognized importance in patients with multimorbidity15,16. The prevalence of SDM in MM in other countries was under-reported and the current study is one of the first that reported the prevalence of SDM and TD in patients with MM. However, shared decision making remained underutilized in many populations (e.g., without MM) internationally; for example, a study found that around only half of the seriously ill patients who wished to refuse resuscitation, had a ‘do-not-resuscitate’ order, and healthcare professionals were found to have a poor understanding of these preferences28.

Yet, SDM might improve patients’ outcomes. A Cochrane review of randomized controlled trials supported that the involvement of patients through using decisional aids, could improve their knowledge and reduce internal conflicts within decision making29. A cohort study in women with breast cancer also suggested that shared decision making enhanced patients’ quality of life30. Evidence also suggested that shared decision making may reduce the financial burden of healthcare systems, because when provided with choices, participants often opted for more conservative, rather than intensive and expensive treatments29. However, despite shared decision making being recommended in managing patients with multimorbidity by international guidelines15,16, there remains a relative lack of research showing that SDM can directly impact on patients’ physical health.
In addition, it is not known how SDM can be promoted. A systematic review suggested that the major barriers to SDM included time constraints, patients' characteristics and nature of diseases. While decisional aids were suggested to help patients make informed decisions, the relevance of these aids to patients with multimorbidity was uncertain because these decisional aids were usually disease-focused and were only available for a limited spectrum of diseases. The use of decisional aids in Chinese contexts is especially understudied. Doctors can be reluctant to use decisional aids during consultation because they can lengthen the consultation time by 2.6 minutes, while the average consultation time in GOPC is around 5-7 minutes in Hong Kong. Furthermore, many patients, especially Chinese, may not want to be involved in the decision making process; doctors may be reluctant to involve patients in making decisions if they perceive patients to be unwilling to make a decision, or if the patients were not educated enough to engage in such a discussion. Previous research showed that older Chinese people are less willing to make health-related decisions and the presence of SDM depended also on patients’ education level. The latest Cochrane Review also suggested that there is a lack of evidence of ways to encourage clinicians to involve patients in making decisions. Research on interventions to promote SDM in our patients with MM is therefore needed; such trials can then provide evidence on health benefits and cost-effectiveness, if any, of shared decision making.

The current study recruited more than a thousand patients with multimorbidity from both primary and specialist clinics from all areas of Hong Kong, and represented one of the largest studies in a Chinese population. However, a few weaknesses must be mentioned. Firstly, the study only recruited older patients from the public sector, where most patients with chronic diseases in Hong Kong receive regular care. The extent of the applicability of the results for younger patients and patients in the private sector is not known. Additionally, as a questionnaire study, the results were prone to reporting bias. It is possible that patients could not recall being involved in the SDM process, even if they had been. Future studies may include auditing consultation notes or video-taping doctors’ performance. However, we argue that a treatment plan/shared decision process is only meaningful if the patient can recall them. Furthermore, as a limitation shared with most cross-sectional studies, casual relationships could not be established. For example, while it is most likely that patients with treatment plans could deal with their diseases more effectively, it is also possible that patients who are confident and are motivated in their disease management, can better recall their treatment plan. Finally, the study could not explain the barriers or motivating factors for using shared decision making from the clinicians’ perspective, nor the relevant training needs of the clinicians – and this could be included in future studies.

Conclusions

In conclusion, most patients with multimorbidity in Hong Kong had a treatment plan, but fewer had been involved in making health-related decisions. Treatment plans and shared decision processes appeared to help patients to manage their diseases. Going forward, research is needed on interventions that promote shared decision making in patients with multimorbidity.

Abbreviations

TP: Treatment Plan
SDM: Shared Decision Making
GOPC: General Outpatient Clinic
MM: Multimorbidity
NICE: National Institute for Health and Care Excellence
SOPC: Specialist Outpatient Clinic
GDH: Geriatric Day Hospital
CSSA: Comprehensive Social Security Assistance
OR: Odds ratio
CI: Confidence Interval

Declarations

Ethics approval and consent to participate:
Hong Kong East Cluster Clinical and Research Ethics Committee (CREC Ref. No.: HKEC-2016-018)
Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster (IRB Reference Number: UW 16-087)
Kowloon Central/ East Cluster Clinical and Research Ethics Committee (KC/KE-16-0030/ER-3 & KC/KE-16-0029/ER-3)
Kowloon West Cluster Clinical and Research Ethics Committee (KWC-REC reference: KW/EX-16-096(100-02))
New Territories West Cluster Clinical and Research Ethics Committee (CREC Ref. No.: NTWC/CREC/16026)
The Joint Chinese University of Hong Kong – New Territories East Cluster Clinical Research Ethics Committee (CREC Ref. No: 2015.359)

All the above 6 Ethics committees are affiliated to the Hong Kong Hospital Authority.

Written consent were obtained from all participants before their participation of the project.

Consent for publication: Not applicable

Availability of data and materials: ‘The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.’

Competing Interest: The authors declare that they have no competing interests

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Authors’ contributions:

KPL, SYSW, BHKY, ELYW, DC and EKY were responsible for the literature review section. They also contributed to creating and organizing the figures, as well as the design for the above study. In addition, they were involved in data analysis, data interpretation, and writing the manuscript. While PC and LL were also involved in the data collection and data analysis.

All authors read and approved the final version of the manuscript.

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### Table 1. Proportion of Demographic Characteristics, Shared Decision Making and Treatment Plan (N=1032)

| Characteristics                           | N    | %    |
|-------------------------------------------|------|------|
| **Age group**                             |      |      |
| 60-64                                      | 123  | 11.9 |
| 65-69                                      | 176  | 17.1 |
| 70-74                                      | 176  | 17.1 |
| 75-79                                      | 194  | 18.8 |
| 80-84                                      | 207  | 20.1 |
| 85 and above                               | 156  | 15.1 |
| **Gender**                                 |      |      |
| Male                                       | 552  | 53.5 |
| Female                                     | 480  | 46.5 |
| **Education**                              |      |      |
| No formal education                        | 196  | 19.1 |
| Primary                                    | 392  | 38.2 |
| Secondary                                  | 359  | 35.0 |
| Tertiary or above                          | 80   | 7.8  |
| **Marital status**                         |      |      |
| Married/Cohabitating                       | 690  | 67.4 |
| Widowed/Separated/Divorced/ Single/Not married | 334  | 32.6 |
| **Family income**                          |      |      |
| No income                                  | 106  | 18.0 |
| <$6,000                                    | 258  | 43.7 |
| $6,000-$17,999                             | 122  | 20.7 |
| $18,000-$29,999                            | 52   | 8.8  |
| $30,000                                    | 52   | 8.8  |
| **Social security recipient**              |      |      |
| No                                        | 860  | 83.3 |
| Yes                                       | 172  | 16.7 |
| **Health insurance**                       |      |      |
| No                                        | 927  | 90.9 |
| Yes                                       | 93   | 9.1  |
| **Number of chronic diseases**             |      |      |
| 3-4                                       | 628  | 60.9 |
| 5-6                                       | 285  | 27.6 |
| >6                                        | 119  | 11.5 |
| **Regular doctor**                         |      |      |
| No                                        | 736  | 71.7 |
| Yes                                       | 291  | 28.3 |
| **Regular healthcare facility**            |      |      |
| No                                        | 79   | 7.8  |
| Yes                                       | 940  | 92.2 |
| **Regular doctor or healthcare facility**  |      |      |
| No                                        | 71   | 6.9  |
| Yes                                       | 952  | 93.1 |
| **Source of recruitment**                  |      |      |
| GOPC                                       | 530  | 51.4 |
| SOPC                                       | 141  | 13.7 |
| GDH                                        | 361  | 35.0 |
| **Shared Decision Making and Treatment Plan** |      |      |
| Deciding a treatment according to your will and get you involved | 576 | 64.2 |
| Sometimes/Rarely/Never                    | 321  | 35.8 |
| Always/Often                              |      |      |
| Do you have a treatment plan for your chronic conditions | 183 | 17.9 |
| No                                        | 842  | 82.1 |
| Yes                                       |      |      |
| How confident are you that you can control and manage your health problems | 255 | 25.0 |
| Not very confident/Not at all              | 764  | 75.0 |
| Very confident/Confident                  |      |      |

Table 2. Univariate association between characteristics and Shared Decision Making/Chronic Disease Planning Items by Logistic Regression
Deciding a treatment according to your will and get you involved
Do you have a treatment plan for your chronic conditions
How confident are you that you can control and manage your health problems

| Variables                  | OR (95%CI)       | P-value | OR (95%CI)       | P-value | OR (95%CI)       | P-value |
|----------------------------|------------------|---------|------------------|---------|------------------|---------|
| **Age group**              |                  |         |                  |         |                  |         |
| 60-64                      | ref              | -       | ref              | -       | ref              | -       |
| 65-69                      | 1.393 (0.836, 2.322) | 0.203   | 0.550 (0.280, 1.079) | 0.082   | 1.605 (0.940, 2.739) | 0.083   |
| 70-74                      | 1.409 (0.845, 2.349) | 0.189   | 0.743 (0.371, 1.489) | 0.402   | 1.509 (0.889, 2.563) | 0.128   |
| 75-79                      | 0.966 (0.583, 1.602) | 0.894   | 0.656 (0.335, 1.287) | 0.220   | 1.358 (0.813, 2.268) | 0.242   |
| 80-84                      | 0.874 (0.524, 1.458) | 0.606   | 0.429 (0.226, 0.817) | **0.010** | 1.036 (0.633, 1.696) | 0.889   |
| 85 and above               | 1.159 (0.686, 1.958) | 0.581   | 0.536 (0.270, 1.063) | 0.074   | 1.133 (0.668, 1.923) | 0.643   |
| **Gender**                 |                  |         |                  |         |                  |         |
| Male                       | ref              | -       | ref              | -       | ref              | -       |
| Female                     | 1.054 (0.802, 1.387) | 0.704   | 0.881 (0.640, 1.213) | 0.437   | 0.746 (0.561, 0.990) | **0.042** |
| **Education**              |                  |         |                  |         |                  |         |
| No formal education        | ref              | -       | ref              | -       | ref              | -       |
| Primary                    | 0.961 (0.655, 1.412) | 0.841   | 1.255 (0.818, 1.926) | 0.299   | 1.494 (1.029, 2.169) | **0.035** |
| Secondary                  | 1.069 (0.728, 1.570) | 0.734   | 1.569 (1.002, 2.459) | **0.049** | 1.996 (1.350, 2.953) | **0.001** |
| Tertiary or above          | 0.895 (0.492, 1.629) | 0.717   | 1.017 (0.539, 1.920) | 0.958   | 2.990 (1.513, 5.909) | **0.002** |
| **Marital status**         |                  |         |                  |         |                  |         |
| Married/Cohabitating       | ref              | -       | ref              | -       | ref              | -       |
| Widowed/Separated/Divorced/ Single/Not married | 1.026 (0.766, 1.372) | 0.865   | 1.111 (0.786, 1.571) | 0.552   | 0.753 (0.560, 1.014) | **0.062** |
| **Family income**          |                  |         |                  |         |                  |         |
| No income                  | ref              | -       | ref              | -       | ref              | -       |
| <$6,000                    | 1.374 (0.805, 2.344) | 0.244   | 1.072 (0.599, 1.918) | 0.815   | 0.707 (0.414, 1.208) | 0.205   |
| $6,000-$17,999             | 1.034 (0.555, 1.924) | 0.917   | 1.541 (0.753, 3.154) | 0.237   | 0.880 (0.472, 1.642) | 0.688   |
| $18,000-$29,999            | 1.388 (0.663, 2.906) | 0.384   | 2.140 (0.754, 6.073) | 0.153   | 0.741 (0.343, 1.600) | 0.446   |
| ≥$30,000                   | 1.299 (0.600, 2.814) | 0.507   | 1.744 (0.654, 4.652) | 0.266   | 1.473 (0.607, 3.573) | 0.392   |
| **Social security recipient** |                  |         |                  |         |                  |         |
| No                         | ref              | -       | ref              | -       | ref              | -       |
| Yes                        | 0.818 (0.564, 1.185) | 0.287   | 1.077 (0.697, 1.666) | 0.738   | 0.922 (0.634, 1.340) | 0.669   |
| **Health insurance**       |                  |         |                  |         |                  |         |
| No                         | ref              | -       | ref              | -       | ref              | -       |
| Yes                        | 1.159 (0.713, 1.886) | 0.551   | 1.346 (0.731, 2.477) | 0.340   | 2.330 (1.248, 4.352) | **0.008** |
| **Number of chronic disease** |                  |         |                  |         |                  |         |
| 3-4                        | ref              | -       | ref              | -       | ref              | -       |
| 5-6                        | 0.982 (0.708, 1.334) | 0.861   | 0.819 (0.574, 1.168) | 0.270   | 0.899 (0.647, 1.249) | 0.527   |
| >6                         | 1.375 (0.903, 2.092) | 0.138   | 1.261 (0.725, 2.193) | 0.412   | 0.550 (0.361,0.836) | **0.005** |
| **Regular Doctor/Facility** |                  |         |                  |         |                  |         |
| No                         | -                | -       | ref              | -       | ref              | -       |
| Yes                        | -                | -       | 2.203 (1.295, 3.746) | **0.004** | 1.107 (0.641, 1.911) | 0.715   |
| **Type of clinic**         |                  |         |                  |         |                  |         |
| GOPC                       | ref              | -       | ref              | -       | ref              | -       |
| SOPC                       | 1.157 (0.761, 1.759) | 0.494   | 0.538 (0.338, 0.857) | **0.009** | 0.616 (0.398, 0.954) | **0.030** |
| GDH                        | 0.782 (0.577, 1.060) | 0.113   | 0.554 (0.389, 0.788) | **0.001** | 0.418 (0.306, 0.570) | <**0.0001** |

Table 3. Forward Stepwise Multivariate Model of Characteristics and Shared Decision Making/Chronic Disease Planning Items
### Table 4. Logistic Regression for Shared Decision Making/Chronic Disease Planning Items and Patient’s Confidence

| Variables                                                                 | How confident are you that you can control and manage your health problems | How confident are you that you can control and manage your health problems |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|
|                                                                           | Univariate *                                                             | Multivariate *                                                           |
| Do you have a treatment plan for your chronic conditions                  | OR (95%CI)                  | P-value | OR (95%CI)                  | P-value |
|                                                                           | ref                                                                 | 2.195 (1.559, 3.092)        | <0.0001 |
|                                                                           | ref                                                                 | 2.503 (1.715, 3.653)        | <0.0001 |
| Deciding a treatment according to your will and get you involved          | ref                                                                 | 1.381 (0.994, 1.918)        | 0.054 |
|                                                                           | ref                                                                 | 1.298 (0.929, 1.812)        | 0.126 |
| Number of chronic disease                                                 | ref                                                                 | 0.953 (0.676, 1.342)        | 0.781 |
|                                                                           | ref                                                                 | 0.569 (0.365, 0.885)        | 0.012 |
| Education                                                                | ref                                                                 | 1.980 (1.155, 3.395)        | 0.013 |
|                                                                           | ref                                                                 | 0.608 (0.377, 0.979)        | 0.041 |
|                                                                           | ref                                                                 | 0.585 (0.410, 0.835)        | 0.003 |
| Number of chronic disease                                                 | ref                                                                 | 0.605 (0.384, 0.953)        | 0.030 |
|                                                                           | ref                                                                 | 0.485 (0.351, 0.670)        | <0.0001 |
| Type of clinic                                                            | ref                                                                 | 0.608 (0.377, 0.979)        | 0.041 |
|                                                                           | ref                                                                 | 0.585 (0.410, 0.835)        | 0.003 |
| Number of chronic disease                                                 | ref                                                                 | 0.605 (0.384, 0.953)        | 0.030 |
|                                                                           | ref                                                                 | 0.485 (0.351, 0.670)        | <0.0001 |
| Significant Variables                                                     | OR (95%CI)                  | P-value | OR (95%CI)                  | P-value |
| Education                                                                | ref                                                                 | 1.358 (0.920, 2.003)        | 0.123 |
|                                                                           | ref                                                                 | 1.707 (1.134, 2.571)        | 0.010 |
|                                                                           | ref                                                                 | 2.927 (1.430, 5.992)        | 0.003 |
| Number of chronic disease                                                 | ref                                                                 | 0.953 (0.676, 1.342)        | 0.781 |
|                                                                          | ref                                                                 | 0.569 (0.365, 0.885)        | 0.012 |

* The relationship between the presence of SDM or TP and patients’ confidence to manage illnesses.

^ ORs of SDM and TP were mutually adjusted

### Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- **MMAppendix.docx**