Association of Shared Decision Making with Inpatient Satisfaction: A Cross-Sectional Study

Huiwen Luo
Department of Hospital Management, School of Public Health, Fudan University, NHC Key Laboratory of Health Technology Assessment (Fudan University)  https://orcid.org/0000-0002-4847-4091

Guohua Liu
Shanghai Medical Ethos Association

Jing Lu
Shanghai Medical Ethos Association

Di Xue (✉ xuedi@shmu.edu.cn)  
https://orcid.org/0000-0002-9210-2383

Research article

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Abstract

Background: We assess inpatient perceived shared decision making (SDM) and test the association of SDM with inpatient satisfaction in public tertiary hospitals in Shanghai, China.

Methods: A cross-sectional survey was conducted with 2585 inpatients in 47 public tertiary hospitals in Shanghai in July and August 2018. We assessed SDM overall and 4 aspects of SDM and tested the factors that influenced SDM and the association of SDM with patient satisfaction (patient satisfaction with physician services, medical expenses, outcomes and inpatient care overall), adopting multilevel mixed linear regression models.

Results: The positive response rate (PRR) for SDM overall among the inpatients of public tertiary hospitals in Shanghai was high (95.30%), while the PRR for “My physician informed me of different treatment alternatives” was relatively low (88.63%). In addition, inpatients who underwent surgery during admission had higher PRRs and adjusted PRRs for SDM overall than those who did not undergo surgery (96.01% vs. 95.00% and 94.15% vs. 92.99%, respectively). Based on three-level mixed regression models, the study showed that inpatients with positive responses for SDM overall had higher adjusted satisfaction rates (SRs) for physician services, medical expenses, outcomes and inpatient care overall (98.89%, 91.73%, 98.44% and 97.34%, respectively) than those without positive responses (88.91%, 72.44%, 88.66% and 87.86%, respectively). The greatest differences in adjusted SRs between inpatients with or without positive responses for SDM were found for inpatient satisfaction with medical expenses and informed consent in SDM.

Conclusions: Inpatient PRRs for SDM in public tertiary hospitals in Shanghai are high overall but are lower for information about alternatives. SDM can be affected by the SDM preference of both patients and physicians, medical condition, physician workload and professional requirements. Patient satisfaction with physician services, medical expenses, treatment outcomes and inpatient care overall can be improved through good SDM.

Background

The patient experience of medical care is an important aspect of quality of care. The measurement of patient experience and the dissemination of the measurement results can help to identify weaknesses in medical care, improve medical care quality and promote patient choice [1, 2]. Patient satisfaction is a key measure of the quality of healthcare systems that reflects patients’ experiences and has been added to the performance assessments of hospitals in some countries[3, 4].

Shared decision making (SDM) involves the participation of both physicians and patients in medical decision making by weighing the available medical evidence and the values and preferences of patients [5, 6]. The aim of SDM is to promote patient autonomy and make informed, patient-centered decisions [7, 8]. SDM consists of four elements: two parties (physicians and patients) involved in SDM, participation in the process of decision making by both physicians and patients, information sharing as a prerequisite for SDM, and a treatment decision made and agreed upon by the physician and the patient [9]. The core of SDM is that physicians and patients develop the best treatment plan for patients through discussion with the aim of
maximizing patients' benefits [10, 11]. Many studies have revealed that SDM can lead to higher patient satisfaction and trust, timely diagnosis and decisions, fewer unnecessary referrals, diagnostic tests and medical treatment, higher patient adherence to medications and treatment, greater safety and reduced adverse events, and improved health outcomes and can protect patients’ rights and welfare [12-20]. However, socioeconomic factors may significantly influence patients’ perceptions of SDM [21].

In measuring SDM, the Perceived Involvement in Care Scale (PICS) [22], the 9-item Shared Decision Making Questionnaire (SDM-Q-9) [23], the Shared Decision Making Questionnaire—physician version (SDM-Q-Doc) [24], and CollaboRATE [25] are often used to assess patient involvement in SDM and encouragement from physicians to achieve SDM. However, patient information preferences, which reflect patient autonomy, and informed consent, which reflects respect for patient autonomy in special medical care (such as high-risk, costly or considerable out-of-pocket medical care), are not included in current SDM studies. In studies on the effect of SDM on patient satisfaction, treatment satisfaction [8, 16, 26] or decision satisfaction [27] have been the main focus. It remains unknown whether good SDM leads to better patient perceptions of physician services and of medical expenses and treatment outcomes.

**Objectives**

The goals of this study were to analyze the status of SDM in inpatient care in tertiary public hospitals in Shanghai and to test whether good SDM leads to higher inpatient satisfaction with overall inpatient care, physician services, medical expenses and treatment outcomes.

**Methods**

**Data source**

A cross-sectional inpatient survey was conducted in 47 tertiary public hospitals (32 general hospitals and 15 specialty hospitals) in Shanghai in July and August 2018. Only three tertiary public hospitals in Shanghai (one mental health center, one hospital specializing in infectious disease, and one with no inpatient care) were excluded from the study. Because 90% of all patients receive medical care at public hospitals in China [28], patient care in public hospitals can generally represent patient care in China.

A random sample of the inpatients who had completed their main medical care (such as surgeries or therapeutic procedures) was selected from each of the sampled tertiary public hospitals during one workweek. The number of sampled inpatients in each hospital was 55 on average (52 to 79). All the voluntary investigators, who were mainly senior medical students from the major medical colleges in Shanghai, were trained on the inpatient survey. The survey was conducted via an e-questionnaire administered on iPads. Oral informed consent was obtained before patients’ participation in the survey.

In the questionnaire survey, the data related to inpatient satisfaction, inpatients’ perceived SDM, public hospital type (general vs. specialty), inpatient characteristics (such as gender, age, residence (Shanghai vs. non-Shanghai), education, family monthly income (<5k, 5k-, 10k-, 20k-, 50k RMB)], cancer experience (yes vs.
no), having surgery (yes vs. no) and admitting clinical department (internal medicine, surgery, gynecology, pediatrics, traditional Chinese medicine, ENT, others) were collected.

**Measures**

**SDM scale** Thirteen items were used to assess four aspects of SDM in inpatient care (Table 1). The four aspects included “Patients’ information preference”, “Patients’ active involvement in SDM”, “Patients’ perceived encouragement from their physicians to achieve SDM” and “Informed consent”. Of the four aspects, the former two aspects reflected patients’ desire for autonomy, while the latter two aspects reflected patients’ perceived autonomy support [14]. The items in the aspect “Patients’ active involvement in SDM” were based on PICS [22], and items in the aspect “Patients’ perceived encouragement from their physicians to achieve SDM” were based on the SDM-Q-9, SDM-Q-Doc, CollaboRATE and PICS [22-25]. The items in the aspects “Patients’ information preference” and “Informed consent” were developed by the authors according to important relevant issues with respect to patient autonomy. Experts in medical care quality were consulted for all the items in the SDM scale.

Each item of the SDM assessment was rated using a 5-point Likert scale: 1 for “strongly disagree”, 2 for “disagree”, 3 for “neither agree nor disagree”, 4 for “agree” and 5 for “strongly agree”. In this study, the percentage of inpatients who rated an item on the SDM scale as “strongly agree” or “agree” was referred to as the positive response rate (PRR) for this item.

**Inpatient satisfaction scale** Based on our previous inpatient satisfaction scale and consultation with experts in medical care quality, four dimensions with 35 items were used to assess inpatient satisfaction (Supplement 1). The four dimensions of the inpatient satisfaction scale were “Facilities and equipment”, “Physician services”, “Nonphysician services” and “Medical care process and effectiveness”. To assess the association of inpatients’ PRRs for SDM with their satisfaction, overall inpatient satisfaction with medical care, the dimension of “Physician services” (termed “physician services” hereafter) and two items, “Medical expenses are reasonable” and “I was satisfied with medical care outcomes” (referred to as “medical expenses” and “treatment outcomes” hereafter, respectively) were used.

Each item of the inpatient satisfaction scale was scored using a 5-point Likert scale: 1 for “very dissatisfied”, 2 for “dissatisfied”, 3 for “neither satisfied nor dissatisfied”, 4 for “satisfied” and 5 for “very satisfied”. If an item was irrelevant to a surveyed inpatient, this item was treated as a missing value for this patient. In the analyses, the missing value of an item was replaced by the average score of the item. The percentage of inpatients who rated medical care equal to or greater than 4 is referred to as the inpatient satisfaction rate (SR), while the percentage of inpatients who rated medical care equal to 5 is referred to as the inpatient high satisfaction rate (HSR).

The psychometric analysis indicated that the inpatient satisfaction measure used in this study had relatively good construct validity based on standard tests of goodness of fit using a confirmatory factor analysis model (GFI=0.8530; AGFI=0.9030; SRMR=0.0366; RMSEA=0.0501) and had high internal reliability (overall Cronbach’s α=0.9477).
Statistical analyses

We computed the average PRR for items of a given aspect as the PRR for each aspect of SDM. We also calculated the average PRR for the 13 items of the SDM scale in the survey as a summary statistic, which we refer to as “PRR overall”. PRR overall was computed as the average of all responses received and then computed separately for general hospitals and specialty hospitals, for inpatients with cancer and without cancer, and for inpatients who had surgery and those who did not have surgery.

We computed both SRs and HSRs for medical care overall, physician services, medical expenses and treatment outcomes. The SRs and HSRs for physician services and overall inpatient care were the average SRs and HSRs of the items in the “Physician services” dimensions and of all items of the inpatient satisfaction scale.

To examine whether hospital type, admission department, cancer experience, and having surgery during admission affected inpatient PRRs for the four aspects of SDM and SDM overall, we applied t tests and two-level mixed linear regression models.

In the two-level mixed linear regression models, random effects (intercepts) were specified at the hospital level to take into account the fact that inpatients were nested within hospitals. In the above models, hospital type, admitting department, cancer experience, surgery during admission and inpatient characteristics (gender, age, residence, education and family monthly income) were used as fixed effects. The two-level mixed linear regression models could control potential confounders to some extent. To test the appropriateness of using two-level mixed linear regression models to account for the nesting of individuals within hospitals, we first ran the empty model. The results revealed significant differences in inpatient perceptions of SDM among hospitals (P<0.05). We also tried three-level mixed linear regression models that accounted for the nesting of the SDM questions within inpatient individuals within hospitals. However, the empty models did not support the use of three-level mixed linear regression models.

To illustrate the differences in adjusted PRRs between groups of inpatients, we used the coefficients in the two-level mixed linear regression models to predict the adjusted PRRs while holding all other variables constant at their means and graphically presented relevant predictions.

To test the differences in inpatient SRs and HSRs overall and for physician services, medical expenses and treatment outcomes between inpatients with or without positive responses for SDM overall and the four aspects of SDM, we used three-level mixed linear regression models that accounted for the nesting of the satisfaction questions within inpatients within hospitals. In the models, positive SDM responses referred to the average PRRs for each dimension of SDM or SDM overall that were equal to or greater than 80%. These analyses were conducted separately for the model responses for SRs and HSRs. To determine the appropriateness of three-level mixed linear regression models, we examined the empty models of inpatient SR and HSR overall and inpatient SRs and HSRs for physician services, medical expenses and treatment outcomes. The results showed significant differences in SRs and HSRs among hospitals (P<0.01) and among individuals nested in hospitals (P<0.05), except for the inpatient SR for medical expenses among hospitals (P>0.05). In these models, hospital type, admitting department, cancer experience, surgery during...
admission and inpatient characteristics (gender, age, residence, education and family monthly income) were used as the fixed effects. The three-level mixed linear regression models could also control potential confounders to some extent.

This study was approved by the Institutional Review Board of the School of Public Health, Fudan University (IRB#2018-05-0683).

Results

Inpatient characteristics

A total of 2585 inpatients in tertiary public hospitals (called “tertiary hospitals” hereafter) in Shanghai participated in the study. Among the surveyed inpatients, 69.90% were from general hospitals, 55.86% were aged below 60 years old, 52.19% were female, 73.15% had a high school education or below, 37.18% had a family monthly income below 5 thousand yuan, and 60.85% were Shanghai residents. In addition, 15.05% of the surveyed inpatients suffered from cancer, and 44.06% of them had at least one surgery during hospitalization. Inpatients admitted to internal medicine, surgery, obstetrics and gynecology, pediatrics, traditional Chinese medicine (TCM), ENT and other departments accounted for 34.31%, 33.73%, 13.11%, 2.21%, 1.66%, 9.83% and 5.15% of the sample, respectively (Supplement 2).

Inpatient PRRs for SDM

The study showed that the PRR for SDM overall among the inpatients of tertiary hospitals in Shanghai was 95.30%, and the PRRs for the four aspects of SDM (“Patients’ information preference”, “Patients’ active involvement in SDM”, “Patients’ perceived encouragement from their physicians to achieve SDM” and “Informed consent”) were 97.33%, 93.71%, 94.88% and 95.69%, respectively. Although all items of the four aspects had PRRs above 85% (88.63%~98.26%), “My physician informed me of different treatment alternatives” had the lowest PRR (88.63%) (Table 1).

Comparison of PRRs between different groups of inpatients

The study showed that the PRR for SDM overall among the inpatients in general hospitals was higher than that of patients in specialty hospitals (96.01% vs. 95.00%) and that the PRR for SDM overall among inpatients who had surgery during admission was higher than that among those who did not have surgery during admission (96.09% vs. 94.68%). The study also showed that inpatients who had any surgery during admission had higher PRRs for the four aspects of SDM than those who had no surgery during admission (97.96%, 94.66%, 95.72%, and 96.39% vs. 96.83%, 92.97%, 94.23%, and 95.13%, respectively). In addition, inpatients in pediatric departments had lower PRRs for the aspects of “Patients’ information preference” and “Patients’ perceived encouragement from their physicians to achieve SDM” than those in nonpediatric departments (93.46% vs. 97.41% and 91.39% vs. 94.96%, respectively). Inpatients with cancer had a higher
PRR for “Patients’ perceived encouragement from their physicians to achieve SDM” than those without cancer (96.28% vs. 94.64%) (Table 2).

After the application of two-level mixed linear regression models to control for the random effect of hospitals and other fixed effects (Supplement 3), inpatients who had surgery had a relatively higher adjusted PRR for SDM overall (94.15%) and higher adjusted PRRs for “Patients’ information preference” (95.57%), “Patients’ perceived encouragement from their physicians to achieve SDM” (93.17%) and “Informed consent” (96.05%) than those who did not have surgery (92.99%, 94.26%, 92.03%, and 94.70%, respectively), while inpatients in pediatric departments had significantly lower adjusted PRRs for “Patients’ information preference”, “Patients’ perceived encouragement from their physicians to achieve SDM” and SDM overall (92.37%, 89.55% and 91.27%, respectively) than those in nonpediatric departments (97.46%, 95.66% and 95.88%, respectively). However, there was no significant difference in the adjusted PRR for SDM overall and the four aspects between inpatients with and without cancer or between inpatients of general hospitals and inpatients of specialty hospitals (Fig. 1).

**Association of SDM with inpatient satisfaction**

Among the surveyed inpatients, the SRs for inpatient care overall, physician services, medical expenses, and treatment outcomes were 96.71%, 98.21%, 90.40% and 97.75%, respectively, and the HSRs for these indicators were 87.63%, 91.45%, 73.95% and 87.81%, respectively.

After the adoption of the three-level mixed linear regression models to account for the nesting of the satisfaction questions within inpatients within hospitals and to control for other fixed effects, the study showed that inpatients with positive responses for SDM overall had higher adjusted SRs for inpatient care overall, physician services, medical expenses and treatment outcomes (97.34%, 98.89%, 91.73% and 98.44%, respectively) than those without positive responses for SDM overall (87.86%, 88.91%, 72.44% and 88.66%, respectively) (Table 3).

With regard to inpatient satisfaction with overall inpatient care, physician services, medical expenses and treatment outcomes, the greatest differences in both adjusted SRs and adjusted HSRs between inpatients with and without positive responses for all four aspects of SDM and SDM overall were found for the “Medical expenses” item (10~20 percentage points and 15~30 percentage points, respectively). Among the 4 aspects of SDM, the greatest differences in both adjusted SRs and adjusted HSRs were observed for the “Informed consent” aspect (10~19 percentage points and 19~30 percentage points, respectively) (Table 3).

**Discussion**

**High overall perception of SDM but lower perception of informing about alternatives**

In recent years, with rapid innovation and more uncertainty in medical care, hospitals have become increasingly aware of delivering “patient-centered” care and have paid increasing attention to physician-
patient communication and SDM [29, 30].

In this study, we found that the PRR for SDM overall among the inpatients of tertiary hospitals in Shanghai was 95.30%, and the PRRs for four aspects of SDM were 93.71%~97.33%. Compared to 87% of the patients with newly diagnosed, localized prostate cancer who reported being actively involved in treatment decision making [31], and compared to the mean SDM-Q-9 score (68, full score=100) and the median CollaboRATE score (93, full score=100) in outpatients with vascular malformations [32], “Patients’ active involvement in SDM” and “Patients’ perceived encouragement from their physicians to achieve SDM” among the inpatients of tertiary hospitals in Shanghai (93.71 and 94.88%) were relatively high. This high perceived SDM might be partly because tertiary hospitals in Shanghai have implemented the action plan called for by the central and local government to further improve medical service and to train their staff in physician-patient communication skills [33, 34].

However, similar to another study in cardiology that revealed that fewer patients reported “some” or “a lot of” discussion of the pros and cons of treatment options (88% and 58% for transcatheter aortic valve replacement; 78% and 49% for surgical aortic valve replacement, respectively) [35], we found that the PRR for “My physician informed me of different treatment alternatives” was relatively low (88.63%). The basis for patients’ involvement in treatment decisions is patients’ full understanding of different treatment alternatives [36], which is also the basis for patients signing informed consent for surgery. If patients are not informed about alternatives, it is difficult for them to know whether the treatment recommended by physicians will be the most beneficial.

### SDM affected by preference, medical condition, workload and requirements

In this study, we found that inpatients who had any surgery during admission had better perceptions of SDM than those without any surgery. These findings remained similar when we used two-level mixed linear regression models to control for other factors. Complex clinical decisions with higher risks and more critical health outcomes in the patients survey [37] may have led to both patients and physicians having a higher preference for SDM. Moreover, informed consent before surgery is required not only as a legal doctrine but also as patient-centered care [38]. SDM in inpatients undergoing surgery helps physicians understand patients’ values, preferences, and needs and helps patients understand the benefits and risks of surgical alternatives to reduce physician-patient conflict and protect patient interests [39, 40]. All these factors may be the reasons for better SDM in inpatients who had any surgery.

In addition, inpatient PRRs and adjusted PRRs for “Patients’ information preference” and “Patients’ perceived encouragement from their physicians to achieve SDM” in pediatric departments were significantly lower than those in nonpediatric departments. Lack of knowledge of pediatric illness and care may cause parents or caregivers of children to hesitate to ask for related information [41] and to not actively be involved in SDM [31]. In addition, the shortage of pediatricians and heavy workload are the main environmental barriers for pediatricians to participate in the SDM process [42].
Similar to other studies [43, 44], our study found that inpatients with cancer had a significantly higher PRR for “Patients’ perceived encouragement from their physicians to achieve SDM” than those without cancer (96.28% vs. 94.64%). The reason for this could be that the guidelines for communication with cancer patients strongly recommend that physicians clarify treatment goals for patients to support their hope and understanding, provide them with information about all available treatment options and the advantages and disadvantages of each option, and respect their treatment autonomy [45]. However, there was no significant difference in the adjusted PRRs in SDM between inpatients with and without cancer.

Inpatient satisfaction improved by SDM

Our study revealed that the inpatients with positive responses overall regarding SDM had much higher adjusted SRs for physician services, medical expenses, treatment outcomes and inpatient care overall (98.89%, 91.73%, 98.44% and 97.34%, respectively) than those without positive responses overall (88.91%, 72.44%, 88.66% and 87.86%, respectively). SDM had a similar effect on adjusted HSRs but larger differences between the two groups.

Furthermore, our study had the unique finding that SDM had a greater influence on inpatient satisfaction with medical expenses and that informed consent had a greater influence on inpatient satisfaction in tertiary hospitals in Shanghai. In tertiary hospitals, medical expenses can be a high burden for patients, and treatment selection is an important determinant of patient outcome. Good SDM can reduce medical costs of care [46, 47], facilitate discussion of the benefits, risks and costs (including considerable out-of-pocket treatments) of options [35, 48], and enhance informed consent for complex clinical decisions [38]. Therefore, better SDM (especially informed consent) in tertiary hospitals in Shanghai can improve patient satisfaction with medical expenses, treatment outcomes, physician services and patient satisfaction overall.

Limitation

All hospitals included in our study were located in Shanghai, one of the most developed areas in China, and our findings may not be generalizable to hospitals in other areas of China. In addition, the surveyed inpatients in our study had not been discharged from the hospitals, although they had completed their main medical care (such as surgeries or therapeutic procedures). Therefore, there might be a systemic bias in patient selection. However, the overall satisfaction rate of the inpatients who were still hospitalized was not significantly different from the inpatients who were surveyed during their hospital discharge process (96.71% vs. 97.01%, P>0.05) in our contemporaneous survey. The inpatients surveyed during their hospital discharge process were not surveyed with regard to SDM. Therefore, the bias from our inpatient survey might not be significant. Moreover, many factors contribute to patients’ perceived SDM and patient satisfaction [21, 49, 50]. We used two-level or three-level mixed linear regression models to minimize some potential confounders (including socioeconomic factors), but other confounders were not controlled in the study. This may affect our results to some extent.

Conclusion
The inpatient PRRs for SDM in public tertiary hospitals in Shanghai are high overall but are lower with regard to information about alternatives. Furthermore, SDM can be affected by the SDM preferences of both patients and physicians, medical condition, physician workload and professional requirements. Patient satisfaction with physician services, medical expenses, treatment outcomes and inpatient care overall can be improved through good SDM, especially by providing information about treatment alternatives to patients and obtaining informed consent when treatments or procedures are high risk, expensive or involve considerable out-of-pocket costs.

**Abbreviations**

SDM: Shared decision making; PICS: Perceived Involvement in Care Scale; SDM-Q-9: 9-item Shared Decision Making Questionnaire; SDM-Q-Doc: Shared Decision Making Questionnaire—physician version; PRR: Positive response rate; SR: Satisfaction rate; HSR: High satisfaction rate; TCM: Traditional Chinese medicine

**Declarations**

**Ethics approval and consent to participate**

This study was approved by the Institutional Review Board (IRB) of the School of Public Health, Fudan University (IRB#2018-05-0683). Oral informed consent was approved by the IRB and was obtained before patient participation in the survey.

**Consent for publication**

Not applicable.

**Availability of data and materials**

The data set for the current study is available from the corresponding author upon reasonable request.

**Competing interests**

The authors declare no conflicts of interest.

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Author contributions

X.D., L. G and L.H. were involved in the design of the study; L.J. and L.H. collected the data; L.H. and X.D. analyzed the data and wrote the manuscript; X.D. and L. G revised the manuscript. The final version submitted for publication was read and approved by all authors.

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Tables
Table 1: PRRs for SDM among inpatients in tertiary hospitals in Shanghai †

| Aspects and items | Total (%) (n=2585) |
|-------------------|-------------------|
| **Patients’ information preference** | **97.33** |
| I should sufficiently understand the effects of the disease(s) that I have on my health | 96.43 |
| The physician should explain to me the purposes of the test(s) and/or examination(s) | 98.07 |
| I believe that getting information about the disease(s) is as important as getting information about the treatment | 97.48 |
| **Patients’ active involvement in SDM** | **93.71** |
| I asked my physician to explain the treatment alternatives and process in detail | 91.78 |
| I asked my physician to provide treatment recommendations to me | 91.10 |
| I described my disease symptoms to my physician in detail | 98.26 |
| **Patients’ perceived encouragement from their physicians to achieve SDM** | **94.88** |
| My physician provided me with detailed information about the disease(s) that I have | 97.95 |
| My physician explained to me the diagnostic and therapeutic decisions that I need to make | 98.24 |
| My physician informed me of different treatment alternatives | 88.63 |
| My physician asked me which treatment alternative I prefer | 91.50 |
| My physician and I reached a consensus on the subsequent treatment process | 98.10 |
| **Informed consent** | **95.69** |
| My physician explained medical expenses for special medical care | 93.78 |
| My physician obtained informed consent from me for special medical care | 97.60 |
| **Overall** | **95.30** |

† PRRs: positive response rates.
Table 2: Comparison of PRRs for SDM by hospital type, department, cancer experience and clinical procedures (%)†

| Variables                        | Patients’ information preference | Patients’ active involvement in SDM | Patients’ perceived encouragement from their physicians to achieve SDM | Informed consent | Overall |
|----------------------------------|----------------------------------|------------------------------------|-----------------------------------------------------------------------|-----------------|---------|
| General hospital                 |                                  |                                    |                                                                       |                 |         |
| Yes                              | 97.69                            | 95.19**                            | 95.18                                                                 | 96.81**         | 96.01*  |
| No                               | 97.17                            | 93.08                              | 94.76                                                                 | 95.20           | 95.00   |
| Pediatric department             |                                  |                                    |                                                                       |                 |         |
| Yes                              | 93.46**                          | 94.74                              | 91.39*                                                                | 94.21           | 93.07   |
| No                               | 97.41                            | 93.69                              | 94.96                                                                 | 95.72           | 95.35   |
| Suffered from cancer             |                                  |                                    |                                                                       |                 |         |
| Yes                              | 96.96                            | 93.61                              | 96.28*                                                                | 96.85           | 95.91   |
| No                               | 97.39                            | 93.73                              | 94.64                                                                 | 95.48           | 95.19   |
| Surgery during admission         |                                  |                                    |                                                                       |                 |         |
| Yes                              | 97.96**                          | 94.66*                            | 95.72**                                                               | 96.39*          | 96.09***|
| No                               | 96.83                            | 92.97                              | 94.23                                                                 | 95.13           | 94.68   |

† PRRs: positive response rates; SDM: Shared decision making; * P <0.05, ** P<0.01, *** P<0.001.
Table 3: Comparison of adjusted SRs and HSRs between inpatients with and without positive responses regarding SDM † (%)

| Variables                                      | Overall  | Physician services | Medical expenses | Treatment outcomes |
|------------------------------------------------|----------|--------------------|------------------|-------------------|
| ‡                                               | SRs      | HSRs               | SRs              | HSRs              |
| Patients' information preference               |          |                    |                  |                   |
| Positive response group                         | 97.17    | 88.65              | 98.65            | 92.53             |
| No positive response group                      | 90.18    | 72.21              | 92.14            | 75.77             |
| Patients' active involvement in SDM            |          |                    |                  |                   |
| Positive response group                         | 97.16    | 88.59              | 98.69            | 92.54             |
| No positive response group                      | 92.58    | 77.94              | 93.98            | 81.08             |
| Patients' perceived encouragement from their physicians to achieve SDM |          |                    |                  |                   |
| Positive response group                         | 97.33    | 88.88              | 98.95            | 92.85             |
| No positive response group                      | 90.47    | 73.98              | 91.05            | 76.80             |
| Informed consent                               |          |                    |                  |                   |
| Positive response group                         | 97.20    | 88.45              | 98.78            | 92.38             |
| No positive                                    | 87.12    | 69.35              | 87.47            | 72.05             |

† Adjusted for demographics: age, gender, marital status, and education level.
| Overall SDM |         |         |         |         |         |         |         |
|------------|---------|---------|---------|---------|---------|---------|---------|
| Positive response group | 97.34   | 88.81   | 98.89   | 92.73   | 91.73   | 75.30   | 98.44   | 89.36   |
| No positive response group | 87.86   | 69.54   | 88.91   | 72.74   | 72.44   | 53.26   | 88.66   | 66.87   |

† Three-level mixed linear regression models were used to calculate adjusted SRs and HSRs between inpatients with and without positive responses regarding SDM while controlling for hospital type, admitting department, inpatient characteristics (age, sex, residence, education and income), cancer experience, and having surgery; all p values for the t tests in the models were <0.0001; SDM: shared decision making; SRs: the percentage of inpatients who were “satisfied” or “very satisfied” with medical care; HSRs: the percentage of inpatients who were “very satisfied” with medical care.

‡ The positive response group was defined as the inpatient group in which all the inpatients had an average PRR for a dimension or overall equal to or greater than 80%.

**Figures**
Figure 1

Comparison of the adjusted PRRs for SDM between different groups of inpatients * P<0.05; **P<0.01
Supplementary Files

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