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Older patient participation in discharge medication communication: an observational study

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ABSTRACT

Objective To describe the extent to which older patients participate in discharge medication communication, and identify factors that predict patient participation in discharge medication communication.

Design Observational study.

Setting An Australian metropolitan tertiary hospital.

Participants 173 older patients were observed undertaking one medication communication encounter prior to hospital discharge.

Outcome Patient participation measured with MEDICODE, a valid and reliable coding framework used to analyse medication communication. MEDICODE provides two measures for patient participation: (1) Preponderance of Initiative and (2) Dialogue Ratio.

Results The median for Preponderance of Initiative was 0.7 (IQR=0.5–1.0) and Dialogue Ratio was 0.3 (IQR=0.2–0.4), indicating healthcare professionals took more initiative and medication encounters were mostly monologue rather than a dialogue or dyad. Logistic regression revealed that patients had 30% less chance of having dialogue or dyads with every increase in one medication discussed (OR 0.7, 95% CI 0.5 to 0.9, p=0.01). Additionally, the higher the patient's risk of a medication-related problem, the more initiative the healthcare professionals took in the conversation (OR 1.5, 95% CI 1.0 to 2.1, p=0.04).

Conclusion Older patients are passive during hospital discharge medication conversations. Discussing less medications over several medication conversations spread throughout patient hospitalisation and targeting patients at high risk of medication-related problems may promote more active patient participation, and in turn medication safety outcomes.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ A valid and reliable outcome measure of patient participation was used.
⇒ Non-response bias was low.
⇒ The study was conducted at one site, limiting generalisability.
⇒ Some predictor variables were self-reported, but best available measures were used.
⇒ Fewer doctors were observed compared with other healthcare professional groups, an area for future research.

BACKGROUND

Older patients, with comorbidities, and polypharmacy are at high risk of medication-related harm.[1–3] In fact, 17%–51% of older patients experience medication-related harm after hospital discharge.[4] In 2017, the WHO announced a worldwide call to healthcare professionals, patients and their families, to reduce preventable medication harm by 50% over 5 years. A key recommendation to achieving this goal was patient participation in conversations at transitions of care, such as when patients transition from hospital to home.[5] Given 5 years has passed since the WHO's call, it is essential to explore how patient participation is being realised in practice.

Medication communication is one way that patients participate in their care, to reduce medication-related harm. Manias[6] conceptualises the key attributes required for effective patient participation in medication conversations (See table 1): (1) if the patient is 'silent', the reasons why must be addressed; (2) the patient needs to be encouraged to speak; (3) patient-centred communication must be promoted; (4) patients' needs, priorities and preferences must be considered and (5) healthcare professionals must use understandable language. When these key attributes are met, patients can participate to influence medication safety outcomes. Researchers have suggested that when patients are active participants in medication conversations they provide pertinent information about medications, voice concerns about their medications, identify errors with their medications and can receive pertinent information to enable them to identify safety incidents.[7 8] In a recent meta-analysis, researchers demonstrated interventions that included patient participation significantly reduced adverse events that cause patient

Table 1 Conceptualisation of medication communication

Defining attributes of actual medication communication encounter	Explanation
Who speaks?	Encourage involvement of patient, family members and all healthcare professionals
Who is silent?	Reasons for silences addressed and rectified
What is said?	Patient-centred communication
What aspects of patients' care are prioritised?	Consider the patient's needs
Actual words used by healthcare professionals	Understood by patient

Note. Adapted from Manias.[6]

harm.[9] Overall, patient participation is a solution waiting to be realised.

Available evidence indicates patients participate in medication communication haphazardly. In previous research, older patients have described experiencing no or limited conversations about medications at discharge, resulting in unanswered questions once home.[10] Additionally, a systematic review identified many factors that may make patients 'silent' during medication communication, such as health literacy and patient preference.[11] These barriers appear to go unaddressed by healthcare professionals.[11] Moreover, older patients often feel unprepared and disempowered by healthcare professionals during transitions in care, limiting their participation in conversations.[12] Finally, older patients report that their discharge concerns are not listened to when healthcare professionals make decisions about discharge medications and instructions are not provided in clear language.[13] When comparing Manias' conceptualisation (table 1) to previous research, it is clear that the key attributes of patient participation in medication communication are not being met. In past studies, medication communication has been characterised as one-way or absent (who speaks), with low levels of patient participation (who is silent), a non-patient-centred approach (what is said), using highly technical language (actual words used).[10 11]

There have been no large observational studies showing relationships between patient participation and key attributes that influence patient participation. Understanding patient participation in discharge medication communication is largely based on interview data rather than observation of actual practices.[11 13] Some small-scale observational research has been conducted, providing an indication of how engaged older patients are in discharge medication communication and the factors influencing their participation.[14–16] These observational studies provide rich accounts of human behaviour in its natural setting; a quantitative study with a larger sample size may compliment previous research by expanding on this evidence, confirming the practices of a larger population and allowing testing of relationships between factors. The aims of this study were to:

1. Describe the extent to which older patients participate in discharge medication communication.
2. Identify factors that predict patient participation in discharge medication communication.

METHODS

Setting and participants

This observational study took place in six wards (respiratory medicine, specialised medicine, cardiology medicine, vascular medicine and surgery, neurology medicine and rehabilitation) in an Australian metropolitan tertiary hospital. Wards were selected due to the high proportions of patients aged ≥65 years admitted to these wards. Computers on wheels that had access to electronic medical records were available for healthcare professionals to take to the patient bedside. Each ward had a dedicated pharmacist.

Data collection took place between July 2019 and March 2020. Timing of data collection sessions occurred on Monday–Friday, 07:00–17:30 hours, and data collectors sought to obtain a spread of data across the six wards, by recruiting no more than 50 patients per ward. Within each data collection session, all patients on the selected ward were screened by the trained data collectors for eligibility, and then consecutively approached and engaged in the informed consent process. Data collectors stopped recruitment once a maximum of four patients consented per day, as this was a manageable workload for the data collector. Patients were included if they were: aged ≥65 years; discharged to a location where they would manage their own medications; prescribed ≥6 medications in total; have ≥1 chronic illnesses; estimated discharge date of ≤3 days from time of recruitment; and if their English communication was not strong, they were only included if in the presence of someone who could help them communicate (eg, family member or interpreter). Patients were excluded if they were: physiologically unstable; mentally not capable of participation; discharged to a care facility where others manage their medication, such as aged care facilities; and/or unable to communicate in English and did not have family member or interpreter present to help them communicate. Nurse unit managers or their delegate assisted with determining eligibility criteria. When collecting audiorecorded data, healthcare professionals and family members provided consent if they were present.

Data collection

Three types of data were collected for each patient participant: (1) survey data; (2) observational data and (3) chart audit data. After recruitment, patients completed a self-report survey that included four scales. Three scales were psychometrically tested and included: 'The Short Test of Functional Health Literacy in Adults' (STOFHLA) that measures health literacy[17] ; 'Drug-Associated Risk Tool (DART)' that measures risk of medication-related problems[18] and 'Euroqol Visual Analogue Scale' (EQ VAS) that describes patients' self-rated health status (table 2). We previously developed and tested a general global rating scale that asked participants 'what role do you like in discussing your medicines with healthcare professionals (ie, doctors, pharmacists, nurses)?'.[16] The data collector administered surveys; they visually showed patients the written survey while reading the question aloud and entered responses for patients. Survey responses were entered directly into Research Electronic Data Capture system (REDCap).[19] Patients were also provided the option to view a paper-based form, or if the electronic system was not working, a paper-based form was used, and the data collectors later entered survey data into REDCap.

For observational data, each patient was observed once, during a discharge medication communication encounter. An encounter was defined as the patient and a healthcare professional (nurse, doctor or pharmacist) being together, irrespective of location and they interacted about medications in the ≤3 days before discharge. These encounters did not have to focus on discharge planning specifically. Our pilot worked showed that patients were often seeking information about their discharge medications from a variety of sources in the 3 days leading up to discharge including during medication rounds, doctors' rounds and conversations with pharmacists.[16] Encounters finished when the patient and healthcare professional were no longer in close enough proximity to interact. To identify the encounter, we undertook a pragmatic approach. Our pilot work revealed that approaching healthcare professionals and identifying planned conversations was the easiest way to identify when an encounter would occur. For example, we would approach a nurse and identify when he/she planned to talk about discharge medications with the patient, he/she/they identified a discharge medication was due to be administered at a set time point, and the data collector would arrange to come back at that time.

Observational data were collected using a structured observational tool completed by the data collector observing the encounter and an audio-recording of the encounter. The structured observational tool was based on the Systems Engineering Initiative for Patient Safety 2.0 model[20] and previous literature. Items in the structured observational tool are shown in online supplemental file 1 and include items like who was present for an encounter, communication tools used, and environmental and organisational factors. This observational tool has been shown to have high inter-rater reliability (>98%) and is relevant and clear.[16] The observation tool was located in REDCap. For audiorecording, a lapel microphone connected to a portable audiorecorder was carried by the data collector. Our pilot work revealed patients converse with different types of healthcare professionals about medications; to ensure this variation was captured, we observed patients with a range of healthcare professionals (doctors, nurses and pharmacists).

The final type of data extracted was from patients' clinical notes including: patient age, sex, medical history including chronic medical conditions and patients' medication history (collected from the 'Discharge Medication Record' document which is completed by pharmacists). Data were entered into REDCap.

Data collection was undertaken by one of four trained data collectors (GD, JC, TG and GT); all experienced nurses or pharmacists. We used our pilot study findings[16] to develop a Standard Operating Protocol and in-person training to ensure consistency in data collectors' approach. Training guided data collectors in minimising bias during survey delivery and observations, practicalities in using the audiorecorder and lapel microphone, and training in the structured data collection form. Data collectors watched videos of patient–healthcare professional encounters and independently completed the structured observation tool; inter-rater reliability was 98.4%.

Data analysis

The sample size was based on the requirements for multiple logistic regression, with 10 cases required per independent variable.[21] We intended to test up to 20 predictors that we identified in the literature, thus, a consecutive sample of 200 participants was recruited. However, data for 173 patients were available for analysis, thus, we returned to the literature and our team with content expertise in patient participation and medication communication selected 14 predictors for the final analyses. Decisions were made based on potential collinearity and predictors with lower evidence compared with others.

The patient participation outcome was measured with MEDICODE; a valid and reliable coding framework used to analyse medication communication.[22] It provides two outcome measures of patient participation: (1) 'Preponderance of Initiative' which is a rating of who predominately initiates topics during medication conversations (patient or healthcare professional), which can include questions or statements; and (2) 'Dialogue Ratio' which indicates whether the conversation is monlogue (only one person speaks about the category, which can be the patient or healthcare professional), dyad (each person speaks once about the category) or dialogue (when a person speaks more than once about a category) (see table 2).

To operationalise MEDICODE, the audiorecorded conversations were listened to and coded in Microsoft Excel in relation to a predetermined list of content subcategories, which can be grouped into categories

Table 2 Predictor and outcome variables

Variables	Source	Description	Response options
Predictor variables:			
Age	Chart audit	Patient age	Continuous variable
Sex	Chart audit	Patient sex	Female, male, other
Total medications prescribed at hospital discharge	Chart audit	Total medications prescribed on Discharge Medications Record	Continuous variable
Type of healthcare professional participating	Structured observational tool	Type of healthcare professional leading medication communication during encounter	Nurse, pharmacist, doctor, other
Communication tools used	Structured observational tool	Tools used during communication. Patient must view these tools during communication	Electronic medical record; My Health Record; discharge summary; Discharge Medication Record; 'Consumer Medicines Information' brochure; prescription; patient's medication list from home; patient's own medications from home; hospital medication stock; other
Patient factors	Structured observational tool	Patient factors that influence communication	Poor sight; poor hearing; symptoms; other
Noisy environment	Structured observational tool	Noise present that influences communication	Noise; no noise
Total healthcare professionals present	Structured observational tool	Total healthcare professional present in the room during communication	Continuous variable
Family/friend/carer/ significant other present	Structured observational tool	Total family/friend/carer/ significant other present in the room during communication	Continuous variable
Total medications discussed	Audio file	Total medications discussed during the encounter	Continuous variable
Patient health literacy	Self-report survey: STOFHLA	Measures health literacy	Ranges from 3 to 15 13 or higher=high health literacy 12 or lower=low health literacy[43]
Preferred role in discussing medications with healthcare professionals	Self-report survey: global rating scale developed by our team	A general global rating scale that asked participants 'what role do you like in discussing your medicines with healthcare professionals (ie, doctors, pharmacists, nurses)?	The response options were 'I prefer the healthcare professionals to lead discussions about my medicines', 'I prefer that the healthcare professional and I have shared discussions about my medicines', and 'I prefer to lead discussion about my medicines'
Health status	Self-report survey: EQ VAS	Describes patients' self-rated health status	Ranges from 0 to 100 100=best imaginable health 0=worst imaginable health
Patient risk of medication-related problems	Self-report survey: DART	Measures risk of medication-related problems	Ranges from 0 to 34 Higher scores indicate greater risk of medication-related problems
Outcome variables:			
Preponderance of Initiative	Audio file (coded using MEDICODE)	A rating of who predominately initiates topics during medication conversations (patient or healthcare professional)	Ranges from 0.00 to 1.00 0.00–0.49=monologue 0.50–1.00=dyad and dialogue

Continued

Table 2 Continued

Variables	Source	Description	Response options
Dialogue Ratio	Audio file (coded using MEDICODE)	Indicates whether the conversation is monologue (only one person speaks about the category), dyad (each person speaks once about the category) or dialogue (when a person speaks more than once about a category)	Ranges from −1.0 to 1.0 −1.0 to 0.0=patient was active and took initiative 0.1 to +1.0= healthcare professional was active and took initiative

STOFHLA, The Short Test of Functional Health Literacy in Adults; DART, Drug-Associated Risk Tool; EQ VAS, Euroqol Visual Analogue Scale.

(please see online supplemental file 2 for descriptions).[23] The category 'attitudes/emotions towards a medication' was highly subjective, and coders did not reach acceptable inter-rater reliability, thus it was omitted. Coders code the presence/absence of a subcategory for each medication discussed, and when a subcategory is present the Preponderance of Initiative (who initiates the content subcategory) and the Dialogue Ratio (whether the content subcategory is a dialogue/dyad/monologue) is recorded by coders for each subcategory. In MEDICODE, families are viewed as an extension of the patient, who cannot be disconnected, thus when families advocated by speaking on the patient's behalf this was also included as patient communication.[24]

Excel data were imported into IBM SPSS Statistics for Windows Version 27.[25] We kept data at the subcategory level for analysis, as aggregating the data to the category level would result in all categories being equal, regardless of whether one category had more or less subcategories present, per medication. Thus, the Preponderance of Initiative and Dialogue Ratio scores represent patient participation in the discussion no matter how many subcategories were discussed. To calculate overall outcome scores of patient participation (Preponderance of Initiative and Dialogue Ratio) per patient/encounter, calculations were performed in SPSS as shown in table 3.

The lead researcher (GT) received intensive 2-day training in MEDICODE by a MEDICODE trainer (DR), followed by online training from January to June 2020. Once determined that the lead researcher (GT) had sufficiently mastered MEDICODE, coding commenced with ongoing supervision. Ten per cent of all audiofiles were subjected to intercoder reliability (GT and DR). Discrepancies were resolved through discussion.

Survey, observational and chart data from REDCap was also exported into SPSS[25] for statistical analysis. Descriptive statistics were used to summarise these data, based on data distribution.

Predictor and outcome variables used in regression analyses are in table 2. The outcomes were not normally distributed. Dialogue Ratio was recategorised into monologue or not monologue (which contains dyad and dialogue) using established cut-offs; 0.00–0.49 is viewed as monologue whereas 0.50–1.00 is viewed as dyad and dialogue.[22] This binary outcome was used for logistic regression models. For Preponderance of Initiative, however, there are no established cut-off and about 25% of the patients had a Preponderance of Initiative value of 1. It was not possible to transform this variable using standard mathematical transformations due to the peculiar nature of the distribution. Preponderance of Initiative was, therefore, dichotomised using the theoretical cut-off points in the literature of patient initiative (−1.0 to 0.0), which means the patient was active and took initiative, and healthcare professional initiative (0.1 to +1.0), which means the healthcare professional was active and took initiative.

To identify factors that predict patient participation multivariate logistic regression models for Dialogue Ratio (monologue vs not monologue) and for Preponderance of Initiative (patient initiative vs healthcare professional initiative) were undertaken.[26] Univariate logistic

Table 3 Calculations of outcome variables

Outcome	How outcome calculated per encounter
Preponderance of Initiative	► Sum subcategories present per encounter (SumSsubcategories) ► Sum no of subcategories initiated by healthcare professional (SumHCPInit) ► Sum no of subcategories initiated by patient (SumPtInit) ► Preponderance of Initiative=(SumHCPInit/ SumPtInit)/SumSubcategories
Dialogue ratio	► Sum subcategories present per encounter (SumSubcategories) ► Sum no of subcategories that are monologue (SumMono) ► Sum no of subcategories that are dyad (SumDyad) ► Sum no of subcategories that are dialogue (SumDialogue) ► Dialogue Ratio=((SumMono * 0)+(SumDyad * 0.5)+(SumDialogue * 1))/SumSubcategories

regression models for each predictor were calculated prior to multivariate model building. Variables predictive of the outcomes at p value of <0.20 at the univariate level were included in the multivariate models. Multivariate analysis used an alpha level of significance of ≤0.05. Of note, during univariate testing, the predictor 'type of healthcare professional participating' was significant for the outcome variable Dialogue Ratio, but only for nurses (not doctors and pharmacists), thus the variable was recategorised into nurses versus other healthcare professionals (doctor and pharmacists) for multivariate modelling.

Patient and public involvement

One consumer advisor shaped the research question and grant proposal. She has disseminated the study results to her networks and is involved in using findings from this study to codevelop an intervention to enhance patient participation in discharge medication communication.

RESULTS

In total, n=266 eligible patients were invited to participate in the study, of which N=200 consented to the study and completed surveys. Please see online supplemental file 3 for reasons for refusal. N=175 consented patients were observed; n=25 patients were lost because discharge occurred after hours, unexpectedly against medical advice or prior to data collectors observing them despite their best efforts, further some patients died. Of the n=175 patients observed, n=2 were not included in analysis as no medications were discussed during the encounter.

In the sample, n=68 (38.9%) patients were women; the median age was 74 (IQR=69.0–79.0); most were admitted with vascular/cardiovascular or respiratory conditions; discharged on a median of n=12 medications (table 4).

In addition to the patient, most encounters had one or two people present, which were usually healthcare professionals and sometimes family members (n=117, 67.6%). Medication conversations mostly occurred during pharmacist medication counselling (n=70, 40.5%), nurse medication administration (n=65, 37.6%) or treating team consults (n=28, 16.2%). Family members were present for n=30 (17.1%) conversations. The encounters were a median of 7 min (IQR 5–11 min) in duration. Noise (n=123, 71.1%) and interruptions (n=79, 45.7%) were frequently present during conversations. Communication tools, such as Discharge Medication Records, prescriptions, Consumers Medicines Information sheets, and medication boxes and bottles were used in n=93 (53.8%) encounters; of the n=73 (42.2%) encounters that had a pharmacist present, n=72 (98.6%) of these involved use of a communication tool. Patient factors, like poor hearing or sight, were present in n=36 (20.8%) encounters.

Extent of patient participation

The median for Preponderance of Initiative was 0.7 (IQR=0.5–1.0), which meant the healthcare professional

Table 4 Participant characteristics, self-report survey responses, observational data and outcome measures

Characteristics, survey responses, observational data and outcome measures	Total sample n=173
	Frequency (%)
Females	68 (39.3)
Reason for admission:	
Medical	150 (86.7)
Surgical	23 (13.3)
Reason for medical admission:	
Vascular/cardiovascular	83 (48.0)
Respiratory	54 (31.2)
Neurologic	17 (9.8)
Metabolic	6 (3.5)
Gastrointestinal	3 (1.7)
Other*	10 (5.8)
	Median (IQR)
Age in years	74 (69.0, 79.0)
Total comorbidities†	3 (2.0, 5.0)
Discharge medications‡	
Total medications prescribed per patient	12 (9.0, 16.0)
Unchanged medications per patient	8 (4.0, 12.0)
New medications per patient	3 (1.0, 5.0)
Changed medications per patient	0 (0.0, 1.0)
Ceased medications per patient	0 (0.0, 1.0)
The Short Test of Functional Health Literacy in Adults‡ (possible range 3–15)	14 (11.8, 15.0)
Drug-Associated Risk Tool‡ (possible range 0–34)	23 (21.0, 24.0)
Euroqol Visual Analogue Scale (possible range 0–100)	60 (50.0, 80.0)
Preferred role in discussing medications with healthcare professionals§:	
Active	119 (69.2)
Passive	53 (30.8)
	Frequency (%)
Type of healthcare professional leading medication communication during encounter:	
Pharmacist	73 (42.2%)
Nurse	70 (40.5%)
Doctor	30 (17.3%)
	Median (IQR)
Preponderance of Initiative	0.7 (0.5–1.0)
Dialogue Ratio	0.3 (0.2–0.4)

*Other included cellulitis, muscoskeletal disorder (back pain and constipation), genitourinary disorder and haematoma complications postinsertion of pace makers.
†See online supplemental file 4 for the taxonomy we used for recording comorbidities.
‡≤15 missing data.
§response options binarised: active = 'I prefer that the healthcare professional and I have shared discussions about my medicines', and 'I prefer to lead discussion about my medicines', passive= 'I prefer the healthcare professionals to lead discussions about my medicines'.

Table 5 Factors that contribute to Dialogue Ratio (monologue or not monologue), obtained using multivariate logistic regression (n=173)

Predictor variables	OR	CI	P value
Sex*	1.8	0.6 to 5.7	0.34
Increasing total medications discussed	0.7	0.5 to 0.9	0.01
Type of healthcare professional participating†	2.7	0.8 to 8.4	0.10
Patient factors‡	0.4	0.1 to 2.2	0.31

Note. For Dialogue Ratio, higher odds indicates more chance of not-monologue (dialogue or dyad), while lower odds indicates more chance of monologue.
*Reference: males.
†Reference: nurse participating.
‡Reference: patient factors present, examples of patient factors are poor hearing or sight.

was more actively involved in encounters and took more initiative. Patients took more initiative in n=10 (5.8%) encounters and healthcare professionals took more initiative in n=163 (94.2%) encounters. The median for Dialogue Ratio was 0.3 (IQR=0.2–0.4), which indicated the medication encounters were more of a monologue rather than a dialogue or dyad. In total, n=151 (87.3%) encounters were monologue and n=22 (12.7%) were dialogue or dyads.

Predictors of patient participation

For the outcome Dialogue Ratio, univariate analysis revealed five predictors that had a p values of ≤0.20 (sex, type of healthcare professional participating, total medications discussed, patient factors and communication tools used) (see online supplemental file 5). However, we found the type of healthcare professional participating and communication tools used had high multicollinearity, whereby communication tools (such as Discharge Medication Records, prescriptions, Consumers Medicines Information sheets, and medication boxes and bottles) were predominantly used by pharmacists (98.6% used) while the majority of the other healthcare professionals did not use them. Using univariate analysis, we found an association between healthcare professional participating and the outcome, and our previous research showed that healthcare professionals have different ways undertaking medication communication, thus only type of healthcare professional participating was entered into the model. For Preponderance of Initiative six predictors had a p≤0.20 (total medications discussed, total medications prescribed at hospital discharge, patient risk of medication-related problems, patient factors, family/friend/carer/significant other present and preferred role in discussing medications with healthcare professionals).

Table 5 shows the adjusted odds ratio (OR, 95% CI) for factors that were associated with Dialogue Ratio categorised as monologue and not-monologue obtained using logistic regression. The full model containing all predictors was statistically significant (χ^2 (4, n=173) = 34.9, p≤0.001), indicating that the model was able to distinguish between monologue and not-monologue. The model as a whole explained between 18.3% (Cox and Snell R^2) and 34.3% (Nagelkerke R^2) of the variance in Dialogue Ratio, and correctly classified 87.3% of cases. Only one predictor made a unique statistically significant contribution to the model, namely, the total medications discussed during the encounter (table 5). Patients had 30% less chance of having dialogue or dyads with every increase in one medication discussed (OR 0.7, 95% CI 0.5 to 0.9, p=0.01).

The full model for Preponderance of Initiative, containing predictors that were statistically significant at crude level, is presented in table 6. The multivariate model indicated that it was able to distinguish between patient initiative and healthcare professional initiative significantly (χ^2 (6, n=173) = 14.2, p=0.03). The model as a whole explained between 9.3% (Cox and Snell R^2) and 25.0% (Nagelkerke R^2) of the variance in Preponderance of Initiative, and correctly classified 93.2% of cases. As shown in table 6, only one predictor made a unique

Table 6 Factors that contribute to Preponderance of Initiative (patient or healthcare professional initiative), obtained using multivariate logistic regression (n=173)

Predictor variables	OR	CI	P value
Increasing total medications discussed	1.2	1.0 to 1.5	0.06
Preferred role in discussing medications with healthcare professionals*	0.3	0.1 to 2.4	0.24
Increasing patient risk of medication-related problems	1.5	1.0 to 2.1	0.04
Increasing total medications prescribed at hospital discharge	0.9	0.7 to 1.0	0.06
Patient factors†	0.4	0.1 to 1.8	0.21
Family/friend/carer/significant other present‡	0.2	0.1 to 1.1	0.06

Note. For Preponderance of Initiative, higher odds indicate more chance of healthcare professional initiative, while lower odds indicate more chance of patient initiative.
*Reference: active role preferred in discussing medications with healthcare professionals.
†Reference: patient factors present, examples of patient factors are poor hearing or sight.
‡Reference=yes, family/friend/carer/significant other present.

statistically significant contribution to the model. The strongest predictor of healthcare professional initiative during discussions was patient risk of medication-related problems, recording an OR of 1.5. This indicated that every increase in one more medication-related problem, the likelihood of healthcare professionals taking up conversation topics increased by 50%. In other words, the higher the patient's risk of a medication-related problem, the more initiative the healthcare professionals took in the conversation.

DISCUSSION

Medication conversations were frequently initiated by healthcare professionals and these medication conversations tended to be monologues. Patients at higher risk of medication-related problems tended to take less initiative during medication conversations. While the more medications discussed during an encounter the less dialogue or dyads that occurred.

We found healthcare professionals were taking the initiative to start topics when patients were at high risk of medication-related problems; however, these conversations were largely monologues. Previous research suggests that conversations with patients with complex medications tended to be brisk, one-way and controlled by healthcare professionals.[27] This can be due to traditional cultures of healthcare professionals leading care.[28] Researchers suggest that another reason that pharmacist interactions tended to be rushed was due to the high flow of patients being discharged, and doctors and nurses had limited discharge medication communication with patients due to time constraints and multitasking.[14] Thus, while healthcare professionals were initiating more topics for high-risk patients, there is opportunity for them to encourage more dialogue (ie, two-way communication).

However, our findings also suggest that patients at high risk of medication-related problems were being passive. Previous research with older patients shows patients unknowingly and haphazardly report medication-related problems in hospital.[16] Thus, taking initiative to report medication-related problems could be a behaviour that is promoted more systematically for patients in hospitals. Patient self-assessment tools provide a formalised way for patients to report medication-related problems. In our study, we used the DART tool, which includes patient-centred medication-related problems like adherence issues.[29] DART has been shown to successfully stratify older hospitalised patients into low and high likelihood of medication-related problems[29] and it takes patients 7 min to complete, which patient find acceptable.[18] Ultimately, implementing patient-facing strategies could enhance patient initiative in conversations while providing an additional solution to safety.

When more medications were discussed during an encounter, less two-way communication occurred. This finding may highlight how polypharmacy can cause communication challenges. Patients with a history of polypharmacy have reported receiving conflicting advice in the past, resulting in a lack of trust and problems interacting with healthcare professionals.[30] These types of patients can be at increased risk of not disclosing important information to healthcare professionals[31] such as their medication-related concerns around dependence (25%) and long-term effects (28%), which should be voiced at discharge.[30] Evidence-based clinical guidelines and core competencies for polypharmacy frequently advocate for high levels of patient participation,[32 33] however, encouraging these patients to participate requires more effort from healthcare professionals, compared with non-polypharmacy patients.[31] Overall, the prevalence of polypharmacy is rising and communication with this group is a significant challenge for healthcare professionals. Ongoing research about ways to enhance dialogue (ie, two-way communication) for patients with polypharmacy is critical.

Additionally, our findings have implications for practice, as discussing more medications may affect patient recall. Previous research shows that increased number of recommendations discussed during a doctor–patient interaction is associated with reduced patient recall.[34] Recall prompting techniques may be required in practice, such as having several conversations, about a more limited number of medications, across hospitalisation. A systematic review of health literacy communication techniques supports this strategy, suggesting that limiting the amount of information provided in a session can optimise patient–healthcare professional communication.[35] In addition, increased patient initiative and increased dialogue (ie, two-way conversation) have been associated with enhanced patient recall, highlighting the importance of promoting patient participation in conversations where less medications are discussed.[36]

Overall, conversations tended to be monologues and conversation topics were overwhelming initiated by healthcare professionals; yet, our study showed the almost 70% of patients preferred an active role, thus it is not clear why patients were so passive? The discharge context in acute care wards may entrench patient passivity.[14] Older patients report more satisfaction when discharge medication information is given in an environment of 'peace' and 'quiet'[37], which was inconsistent with the noisy environments in our study. On the other hand, patient-related factors may have influenced passivity. Most patients in our study were admitted for cardiovascular reasons; these patients obtain a range of information in-hospital to support behaviour modification (eg, smoking cessation and healthy eating) and can be overwhelmed when information is not individualised.[38] All of these factors may contribute to patient passivity and raise the question of when is most opportune to promote medication conversations with patients? Older patients do not want to be overwhelmed by medication information on hospital admission, and desire information sharing when their health is improving and they are capable of participation.[14] Thus, a more tailored approach that does not occur only at discharge may facilitate more patient participation.

This study had several strengths. We used MEDICODE a valid and reliable outcome measure to objectively measure patient participation, with intensive support from a researcher trained in MEDICODE (DR). This is a novel contribution

to the evidence on patient participation in discharge medication communication, which has largely been based on small-scale observational research or studies using interviews. Second, risk of non-response bias was acceptable[39]; 34% of participants refused participation or their data were unable to be observed or used in analysis. Third, data collectors underwent standardised training, had high inter-rater reliability and we believe their backgrounds as healthcare professionals made them well attuned to observing contextual cues. Finally, our statistical analysis is justified and clearly described, and all analyses were supported by the statistician (LT) heightening confidence in the results.

This study also has limitations. First, this is a single site study, and findings may not be generalisable to other contexts, however, we recruited our sample from a wide variety of wards and have provided contextual details to enable other researchers to judge the applicability of findings to their setting. Second, less encounters with doctors were observed. While this is a limitation, our previous work demonstrates less medication communication occurs between doctors and patients than other healthcare professional groups, thus we accepted a smaller sample for this group.[16] Third, we acknowledge that some predictor variables were self-reported, however, we used the best available measures. Additionally, social desirability bias could influence some predictor variables, as researchers administered surveys to patients. Fourth, we intentionally recruited patients with polypharmacy, multiple chronic conditions and aged ≥65 years, all significant determinants of medication-related problems.[40–42] Thus, more medication-related problems may be present in the population recruited, influencing our findings. Fifth, our sample had high health literacy (median=14), which limits the use of findings for people with low health literacy. However, we found that people with high health literacy are passive, thus, strategies to increase patient participation for people of all levels of health literacy are required. Sixth, observations only occurred on weekdays; investigating weekend communication is an area for future research. Seventh, our R^2 values suggest that the predictors explain only a small amount of variation in the dependent variable, thus, results should be interpreted with caution. Seventh, the Hawthorne effect could have caused patients/families and healthcare professionals to change their behaviour in response to a data collector being present and audiorecording. Additionally, healthcare professionals helped us to identify an encounter to observe, which could cause selection bias. Data collector training focused on ethnographic strategies to minimise this bias, and microphones were discrete. Finally, decisions were made by the team about removing predictors prior to univariate analysis due to a smaller sample size, which may have influenced the results. These decisions were based on potential collinearity and predictors with lower evidence. For example, the predictor about 'new medications per patient', was removed, as it had less evidence for influence on patient participation than other predictors. While we found that older patients were passive during discharge medication conversations, it could be because there was few 'new medications per patient', and patients were passive due to largely discussing regular medications.

In conclusion, our study indicated patient passivity occurring in the days leading up to discharge is a challenge, and we may need to look to other time points in the patient journey to engage patients in medication conversations. We recommend discussing fewer medications over several conversations to promote active patient participation and recall, especially for polypharmacy patients with long lists of discharge medications. While healthcare professionals are more frequently initiating conversation topics when patients are at high risk of medication-related problems, increasing patient initiative could create a complementary defence in reducing risks associated with medication-related problems.

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Contributors We declare that all the authors, meet the criteria for authorship, have approved the final article version submitted and are listed as authors. In terms of the criteria for authorship, authors contributed in the following ways GT, EM, LT, GD, TT, JW and WC: (1) the conception and design of the study (GT, EM, LT, TT, JW and WC), or acquisition of data (GD, GT) or analysis and interpretation of data (GT, EM, LT, DR and WC); (2) drafting the article or revising it critically for important intellectual content (GT, EM, LT, GD, TT, JW and WC); (3) final approval of the version to be submitted (GT, EM, LT, GD, TT, JW and WC). GT is the guarantor.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval Ethical approval was granted by Gold Coast Hospital and Health Service HREC (HREC/2019/QGC/50809), Griffith University HREC (2019/479) and Deakin University HREC (2019-245). Participants gave informed consent to participate in the study before taking part.

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Data availability statement Data are available on reasonable request. On reasonable request, we can approach our ethics committee about the option of sharing data.

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SUPPLEMENTARY FILES

Supplementary File 1. Structured observational tool

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Observation tool

Please complete the survey below.

Thank you!

1. Today's date	_____
2. Ward	_____
3. Encounter start time	_____
4. Encounter end time	_____
5. Where is this encounter occurring?	☐ Bedside (single room) ☐ Bedside (shared room) ☐ Nurses' station ☐ Corridor ☐ Other
5a. Please specify other location	_____
6. What is the main purpose of this communication encounter?	◯ Medication counselling ◯ Medication reconciliation ◯ Treating team consult ◯ Medication administration ◯ Bedside handover ◯ Discharge planning conversation ◯ Day of discharge conversation ◯ Other
6a. If the communication encounter had more than one purpose, please list other purpose(s):	_____
6b. Please specify other purpose:	_____
7. How does the patient communicate with health care professional(s)?	◯ Face-to-face ◯ Telephone ◯ Written ◯ Other
7a. Please specify other way of communicating	_____

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8. How does the family/friend/carer/significant other communicate with health care professional(s)?	◯ Not applicable ◯ Face-to-face ◯ Telephone ◯ Written ◯ Other
8a. Please specify other way of communicating:	_____
9. What patient factors influence communication?	☐ None ☐ Poor sight ☐ Poor hearing ☐ Symptoms ☐ Other
9a. Please specify other patient factors:	_____
10. What tools are used during communication? (Only tick if patient actively views these)	☐ None ☐ Electronic medical record ☐ My Health Record ☐ Discharge summary ☐ Discharge Medication Record ☐ Consumer Medicines Information ☐ Brochure ☐ Prescription ☐ The patient's medication list from home ☐ The patient's own medications from home ☐ Hospital medication stock ☐ Other
10a. Regarding the patient's own medications from home, were this in a Webster pack or personalised medication packaging?	◯ Yes ◯ No
10b. Please specify what other communication tools were used:	_____
11. What environmental factors influence patient communication?	☐ None ☐ Layout ☐ Noise ☐ Lighting ☐ Temperature ☐ Computer/iEMR ☐ Other

Computer/iEMR

	Inability to maintain eye contact	Speech pattern modifications	Other
11a. What iEMR/computer factors influence patients' ability to communicate?	☐	☐	☐

11b. Please describe other iEMR factor influencing communication:	_____

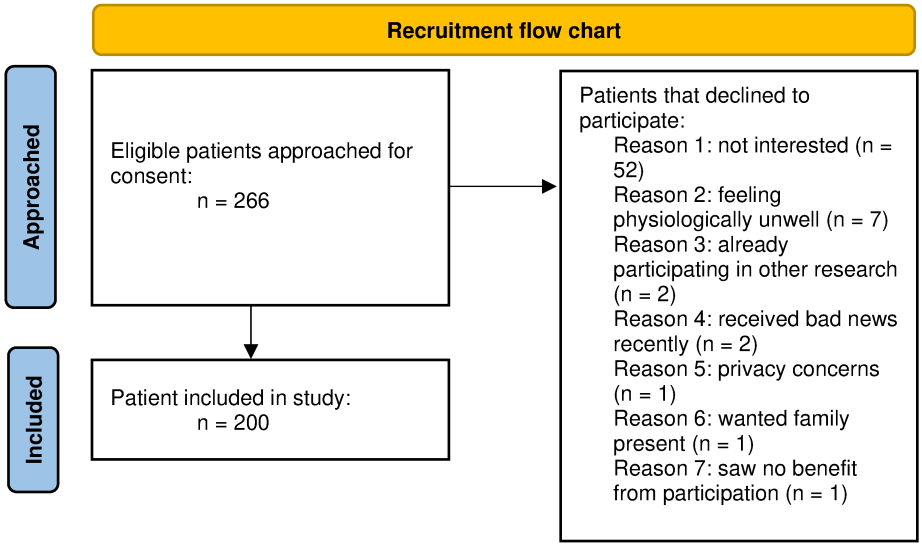
11c. Please specify other environmental factors influencing communication:	_____
12. What organisational factors influence patient communication?	☐ None ☐ Leadership or staff communicates need to quickly transfer the patient i.e. due to bed block ☐ Teamwork: short staffed ☐ Timing: patient transfer has set time (i.e. QAS booked) ☐ Timing: patient/family/carer/SO wishes to be transferred by set time ☐ Technology: lack of computer availability ☐ Other
12a. Please specify other organisational factors influencing communication:	_____
13. What interruptions occurred during the encounter?	☐ None ☐ A HCP interrupts by engaging in the encounter with irrelevant content ☐ A HCP interrupts by engaging in the encounter with relevant content ☐ A HCP undertakes a task in close proximity that diverts attention (but does not engage in the encounter) ☐ A non-HCP interrupts by engaging in the encounter with irrelevant content ☐ A non-HCP interrupts by engaging in the encounter with relevant content ☐ A non-HCP undertakes a task in close proximity that diverts attention (but does not engage in the encounter) ☐ Patient transferred off ward (i.e. for procedure, to transit lounge) ☐ Technology issues ☐ Medical emergency ☐ Phone call ☐ Equipment alarms ☐ Other
13a. Please specify other interruptions:	_____
14. What other tasks occurred during the encounter?	☐ None ☐ Medication administration ☐ Transportation of patient ☐ Packing patient belongings ☐ Taking vital signs ☐ Other
14a. Please specify other tasks occurring during the encounter:	_____

Supplementary File 2. MEDICODE categories and sub-categories.

Category	Sub-categories	Category description
Designation of medication	- Medication named - Long/short action specified - Class name - Appearance/form	"Any reference to medication name, class or description of its format" (Lussier et al., 2016, pp 533).
Main effect or action of medication	- Evidenced/expected effect - Observed effect - Action of medication/treatment	"Discussion of the observed effect and anticipated effect of a medication experienced by the patient" (Lussier et al., 2016, pp 533).
Observed adverse effects	- Observed adverse effects (general) - Observed adverse effects (specific)	"Discussion of side effects of a medication experienced by the patient" (Lussier et al., 2016, pp 533).
Expected adverse effects	- Possible adverse effects (general) - Possible adverse effects (specific)	"Discussion of a potential or predicted side effect of a medication on the patient" (Lussier et al., 2016, pp 533).
Contra indications/warnings	- Contraindications	"Discussion of reasons to not take a medication or to be vigilant" (Lussier et al., 2016, pp 533).
Dosage/instructions	- Instructions for medication use or treatment - Duration of prescription/treatment - Strength of medication/treatment - Mode of administration of medication/treatment - Delay of expected effect	"Any information related to drug regimen" (Lussier et al., 2016, pp 533).
Indications to re-consult	- Indications to consult again about the medication/treatment	"Discussion of reasons for a return visit or getting in touch with the medical team" (Lussier et al., 2016, pp 533).
Adherence to medication	- Patient commitment to adhere - Anticipated or reported compliance - Solutions for compliance problems - Consequences of non-compliance	"Any information related to the patient's adherence behaviour" (Lussier et al., 2016, pp 533).
Attitudes/emotions towards a medication	- Attitudes/emotions towards medication/treatment	"Any expression of concern or worry or a positive or negative attitude towards medication" (Lussier et al., 2016, pp 533).

Lussier, M.-T., et al. (2016). "The impact of a primary care e-communication intervention on the participation of chronic disease patients who had not reached guideline suggested treatment goals." Patient Educ Couns **99**(4): 530-541.

Supplementary File 3. Recruitment flowchart



Supplementary File 4. Taxonomy for coding co-morbidities from chart audit

9. Comorbidities (tick all that apply):	
Myocardial	☐ Angina ☐ Arrhythmia ☐ CHF ☐ Myocardial infarction ☐ Valvular
Vascular	☐ Cerebrovascular disease (stroke or tia) ☐ Hypertension ☐ Peripheral vascular disease or claudication
Pulmonary	☐ Asthma ☐ Chronic obstructive pulmonary disease (COPD, emphysema)
Neurologic	☐ Dementia ☐ Hemiplegia (paraplegia) ☐ Neurologic illnesses (i.e. multiple sclerosis or parkinsons)
Endocrine	☐ Diabetes type I or II ☐ Diabetes with end organ damage ☐ Obesity and/or BMI > 30
Renal	☐ Moderate or severe renal disease
Gastrointestinal	☐ Gastrointestinal disease (hernia or reflux) ☐ GI bleeding ☐ Inflammatory bowel ☐ Mild liver disease ☐ Moderate or severe liver disease ☐ Peptic ulcer disease
Cancer/Immune	☐ AIDS ☐ Any tumor ☐ Leukemia ☐ Lymphoma ☐ Metastatic solid tumor
Psychological	☐ Anxiety or panic disorders ☐ Depression
Musculoskeletal	☐ Arthritis (rheumatoid or osteoarthritis) ☐ Connective tissue disease ☐ Degenerative disc disease (back disease or spinal stenosis or severe chronic back pain) ☐ Osteoporosis
Miscellaneous	☐ Hearing impairment (even with hearing aids) ☐ Visual impairment (cataracts, glaucoma, mac degeneration)

Supplementary File 5. Crude OR (95% CI) obtained using univariate logistic regression

	Dialogue Ratio OR (95% CI; p value)	**Preponderance of Initiative OR (95% CI; p value)**
Age	1.0 (0.9-1.1; $p = 0.92$)	1.1 (1.0-1.2; $p = 0.27$)
Sex (reference= male)	2.4 (0.9-6.9; $p = 0.10$)	0.6 (0.2-2.6; $p = 0.54$)
Type of healthcare professional participating, nurses (reference= pharmacist)	5.5 (1.8-17.4; $p = 0.01$)	0.6 (0.1-2.4; $p = 0.44$)
Type of healthcare professional participating, doctors (reference= pharmacist)	0.7 (0.1-5.6; $p = 0.99$)	0.6 (0.1-3.8; $p = 0.59$)
Total medications discussed	0.6 (0.5-0.8; $p = <0.001$)	1.2 (0.9-1.5; $p = 0.16$)
Total people present (excluding the patient)	1.0 (0.8-1.3; $p = 0.99$)	1.1 (0.7-1.6; $p = 0.77$)
Health status	1.0 (0.9-1.0; $p = 0.78$)	1.0 (1.0-1.0; $p = 0.76$)
Noisy environment (reference=yes)	2.0 (0.6-6.2; $p = 0.24$)	0.6 (0.1-2.9; $p = 0.53$)
Total medications prescribed at hospital discharge	1.0 (0.9-1.1; $p = 0.92$)	0.9 (0.8-1.0; $p = 0.20$)
Patient health literacy	0.9 (0.8-1.1; $p = 0.38$)	1.0 (0.7-1.3; $p = 0.80$
Patient risk of mediation-related problems	1.0 (0.8-1.2; $p = 0.80$)	1.3 (0.9-1.7; $p = 0.14$)
Patient factors (reference= yes)	0.3 (0.1-1.6; $p = 0.16$)	0.4 (0.1-1.4; $p = 0.14$)
Communication tools used (reference= yes)	0.4 (0.2-1.1; $p = 0.09$)	21.8 (0.5-6.6; $p = 0.37$)
Family/friend/carer/significant other present (reference= yes)	0.7 (0.2-2.6; $p = 0.62$)	0.3 (0.1-1.1; $p = 0.07$)
Preferred role in discussing medications with healthcare professionals (reference= active)	0.8 (0.3-1.9; $p = 0.55$)	0.2 (0.1-1.9; $p = 0.18$)