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REPORTS OF ORIGINAL INVESTIGATIONS

Exploring and reconciling discordance between documented and preferred resuscitation preferences for hospitalized patients: a quality improvement study

Recherche et correction de la discordance entre les préférences documentées et réelles en matière de réanimation de patients hospitalisés : une étude d'amélioration de la qualité

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Abstract

Purpose *A discordance, predominantly towards overtreatment, exists between patients' expressed preferences for life-sustaining interventions and those documented at hospital admission. This quality improvement study sought to assess this discordance at our institution. Secondary objectives were to explore if internal medicine (IM) teams could identify patients who might benefit from further conversations and if the discordance can be reconciled in real-time.*

Methods *Two registered nurses were incorporated into IM teams at a tertiary hospital to conduct resuscitation preference conversations with inpatients either specifically referred to them (group I, n = 165) or randomly selected (group II, n = 164) from 1 August 2016 to 31 August 2018. Resuscitation preferences were documented and communicated to teams prompting revised resuscitation orders where appropriate. Multivariable logistic regression was used to determine potential risk factors for discordance.*

Results *Three hundred and twenty-nine patients were evaluated with a mean (standard deviation) age of 80 (12) and Charlson Comorbidity Index Score of 6.8 (2.6). Discordance was identified in 63/165 (38%) and 27/164 (16%) patients in groups I and II respectively. 42/194 patients (21%) did not want cardiopulmonary resuscitation (CPR) and 15/36 (41%) did not prefer intensive care unit (ICU) admission, despite these having been indicated in their initial preferences. 93% (84/90) of patients with discordance preferred de-escalation of care. Discordance was reconciled in 77% (69/90) of patients.*

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Conclusion *Hospitalized patients may have preferences documented for CPR and ICU interventions contrary to their preferences. Trained nurses can identify inpatients who would benefit from further in-depth resuscitation preference conversations. Once identified, discordance can be reconciled during the index admission.*

Résumé

Objectif *Il existe une discordance, qui tend surtout vers un sur-traitement, entre les préférences exprimées par les patients pour les interventions de maintien de la vie et celles documentées lors de l'admission à l'hôpital. Cette étude d'amélioration de la qualité avait pour objectif d'évaluer cette discordance au sein de notre institution. Les objectifs secondaires de notre étude étaient d'explorer la possibilité que les équipes de médecine interne (MI) identifient les patients qui pourraient bénéficier de conversations approfondies et de voir si la discordance pouvait être corrigée en temps réel.*

Méthode *Deux infirmières ont intégré des équipes de MI dans un hôpital tertiaire pour discuter avec les patients hospitalisés de leurs préférences en matière de réanimation entre le 1er août 2016 et le 31 août 2018; les patients leur étaient soit spécifiquement référés (groupe I, n = 165), ou sélectionnés au hasard (groupe II, n = 164). Les préférences en matière de réanimation ont été documentées et communiquées aux équipes, entraînant une révision des ordonnances de réanimation, le cas échéant. La régression logistique multivariée a été utilisée afin de déterminer les facteurs de risque potentiels de discordance.*

Résultats *Trois cent vingt-neuf patients ont été évalués, d'un âge moyen (écart type) de 80 ans (12) et avec un score de 6,8 (2,6) à l'Indice de comorbidité de Charlson. Une discordance a été identifiée chez 63/165 (38 %) et 27/164 (16 %) patients dans les groupes I et II, respectivement. Au total, 42/194 patients (21 %) ne souhaitaient pas de réanimation cardiorespiratoire (RCR) et 15/36 (41 %) préféraient ne pas être admis à l'unité de soins intensifs (USI), malgré une mention dans leurs préférences initiales. Parmi les patients chez lesquels une discordance a été notée, 93 % (84/90) ont préféré une désescalade des soins. La discordance a pu être corrigée pour 77 % (69/90) des patients.*

Conclusion *La documentation des patients hospitalisés pourrait indiquer des préférences pour des interventions de RCR et d'admission à l'USI contraires aux véritables préférences. Des infirmières formées à cet effet peuvent identifier les patients hospitalisés qui bénéficieraient d'une conversation approfondie sur leurs préférences en matière de réanimation. Une fois identifiée, une discordance peut être corrigée lors de l'admission initiale.*

Keywords cardiopulmonary resuscitation · shared decision-making · discordance · intensive care unit · resuscitation preference · advance care planning

Elicitation and documentation of resuscitation preferences for cardiopulmonary resuscitation (CPR) and intensive care unit (ICU) admission at the time of hospital admission is standard practice in North America.[1] These conversations may not be repeated until a subsequent admission or crisis. Frequently, the resuscitation order has no accompanying narrative documentation outlining the rationale for the choice.[2,3] Recent reports suggest that elicitation and documentation of patients' resuscitation preferences are frequently inadequate and often incorrect.[4–13] In the majority of cases, discordance trends towards potential overtreatment with life-sustaining interventions in the ICU.[4–6,9–13] In one Canadian study, estimates of potential overtreatment ranged across hospitals from 14% to as high as 82%.[5] This discordance between patients' expressed and documented preferences can place patients in vulnerable positions. On the one hand, those who prefer less aggressive care may be at risk of receiving unwanted, intrusive, and costly interventions in the ICU. On the other hand, others may receive less care than they would prefer. Both scenarios have been described as a 'medical error'[5] and efforts are urgently needed to reduce its occurrence.

Intervening around discordance requires that patients at risk be prospectively identified by their healthcare teams. To date, research on discordance has largely focused on documenting this error through surveys and structured questionnaires[4–6,12] or through retrospective data

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collection[7,9,11,13,14] rather than face-to-face conversations, further limiting the possibility of intervening in real-time. Thus, we hypothesized that trained and dedicated registered nurses (RN) could confirm the prevalence and nature of discordance and help the healthcare teams conduct further timely conversations to resolve it. The study had two objectives; the first was to assess the level of discordance in our setting, and the second was to explore if the admitting teams recognize which of their patients are at risk of discordance and if the discordance can then be resolved during the index admission.

Methods

The study protocol was prospectively approved by the Health Sciences Research Ethics Board (HSREB) at Western University (#107845). For those patients where written consent could not be obtained in a timely manner (n = 21), an amendment was filed and approved with the HSREB to include their data retrospectively.

Setting

This quality improvement study was conducted on internal medicine (IM) inpatients at a Canadian academic health sciences centre in a midsized urban community (catchment population 1 million). Patients are admitted to one of the three IM teams that typically manage 80–90 patients at any given instance averaging 3,800 admissions per year. Admitted patients usually have multimorbidity[15] and high readmission rates.[16] As per hospital policy, healthcare teams are expected to elicit and document resuscitation preferences for all their patients at admission.

Recruitment

Patients were included if they were ≥ 55 yr with one or more chronic active problems, such as chronic lung disease, coronary artery disease, congestive heart failure, cirrhosis, kidney disease, diabetes, peripheral vascular disease, cancer, or dementia. Exclusion criteria for both groups were an inability to communicate in English, a hearing impairment, an anticipated death or discharge within 24 hr, or a referral to palliative care during the index admission.

Study design

Two ICU RNs with more than 40 years of collective clinical experience were incorporated into IM teams (each two days/week) from 1 August 2016 to 31 August 2018 with the dedicated task of helping the teams elicit resuscitation preferences and goals of care. To get the teams and the nurses working together, context was provided to healthcare teams through email communication, presentations on rounds, formal meetings with IM teams, and educational sessions for allied healthcare staff. Training was provided prospectively through discussion of typical cases over a series of team meetings, role play and an extensive review of literature that included a number of recent advance care planning conversation guides.[17–22] The trained nurses used an open-ended conversation format for eliciting values and

Table 1 Resuscitation orders at the study site (25)

Terminology	Care plan
Attempt resuscitation	Provide all resuscitative interventions as required. CPR, defibrillation, cardioversion, intubation, mechanical ventilation (invasive and non-invasive), vasoactive drugs, antibiotics, IV fluids, ICU care.
Default attempt resuscitation	Resuscitation status conversation deferred for 24 hr as it was deemed not possible at the time of admission.
DNAR advanced	Allow natural death if vital signs absent. NO CPR. NO DEFIBRILLATION. Otherwise, use vasoactive drugs/cardioversion/cardiac monitor/invasive or non-invasive ventilation. Provide advanced resuscitation including life support measures, ICU care.
DNAR basic	Allow natural death if vital signs absent. NO CPR. NO DEFIBRILLATION. NO INVASIVE MECHANICAL VENTILATION. May consider non-invasive ventilation. Use most resuscitative interventions as indicated. May use vasoactive drugs/cardioversion/cardiac monitor, ICU or high dependency unit care.
DNARrestricted	Allow natural death if vital signs absent: NO CPR. NO DEFIBRILLATION. NO MECHANICAL VENTILATION (INVASIVE OR NON-INVASIVE). NO VASOACTIVE DRUGS. Otherwise, use medical treatments/antibiotics/IV fluids as indicated to manage reversible problems. No ICU admission.
DNAR comfort	Allow natural death if vital signs absent. NO CPR. NO DEFIBRILLATION. Otherwise, maximize comfort through symptom management. May use oxygen, suction, and manual treatment of airway obstruction as needed for comfort. No ICU admission.

CPR = cardiopulmonary resuscitation; DNAR = do not attempt resuscitation; ICU = intensive care unit; IV = intravenous;

beliefs[23,24] to ensure provision of patient-centred care while explaining the different resuscitation options (Table 1)[25] and their relationship to patient values.

The multifaceted intervention involved: 1) ascertaining and clarifying resuscitation preferences and fostering shared-decision making (SDM); 2) documentation of the discussions in a designated place in the electronic medical record; and 3) sharing findings with the medical team. The study had two groups; group I consisted of patients specifically referred to the trained nurses by healthcare teams who were invited to 'identify which of their patients might benefit from further conversations about resuscitation preferences'. Initially, these referrals were done in person as the RNs participated in morning rounds with the team. Once the RNs had spent time with each team so that they were familiar with each other and the project, many of the consults occurred by paging the RN. Group II patients were randomly selected by the study team based on a random number generator (https://www.random.org/) from 1 to 26. This number was correlated with alphabet letters and the first patient on the daily work list with the matching corresponding first letter of their last name was approached for the intervention. If this patient had already been assessed by the trained nurses via referral or randomization, another random patient from the worklist was selected. Post-intervention support was provided via debriefs by the RNs or allied healthcare team members including social workers as per standard of care.

Discordance was defined as a difference between the documented resuscitation preferences (Table 1)[25] and those ascertained by the trained nurses. Institutional policy allows only physicians to enter resuscitation orders, hence when discordance was discovered, a physician from the healthcare team was prompted to communicate with the patient/SDM again, confirm patient's expressed preferences, and change resuscitation orders as appropriate. In the remainder of this document, those instances where patients preferred more intensive resuscitation than was initially documented will be referred to as "escalation" and vice-versa as "de-escalation".

Statistical analysis

Patient demographics (Table 2) were described using means and standard deviations or medians and interquartile ranges for continuous variables (depending on their distributions) and counts and percentages for categorical variables. Student *t* test or Mann–Whitney U test was used for continuous variables and Fisher's exact test for categorical variables for comparison of outcomes. To obtain exploratory, hypothesis-generating inferences about factors which were potentially predictive of discordance, we used a multivariable logistic regression model that included *a priori* clinically relevant covariates known[5,13] or assumed to be associated with discordance (Table 5). Goodness of fit and discrimination of the logistic regression model were tested using the Hosmer–Lemeshow test and the C-statistic respectively. Analyses were conducted using Stata version 16 (StataCorp LLC, College Station, TX, USA).

We had initially aimed to recruit 400–600 patients; this would, given an anticipated discordance rate of 23% observed and an incomplete resuscitation order rate of 10% in the earlier phase of this study (unpublished data), result in approximately 100 discordances (the dependent variable). This would allow for an *a priori* evaluation of eight to ten clinically relevant covariates (independent variables) potentially associated with discordance. The study was terminated 1) once we had accumulated 110 discordances; or 2) when the hospital created a new position to continue this work on the unit.

Results

A total of 393 patients were approached for participation and the intervention was provided to all patients or their SDMs. Thirty-seven (10%) patients with out-dated default attempt resuscitation status were excluded; 21 patients refused to have their data included in any research analysis and a complete conversation could not be held with six patients, leaving 329 patients for analysis. At the time of intervention, resuscitation preferences had been elicited and documented by the healthcare teams for 325 (98.5%) of these patients as per standard of care.

The trained nurses were well received by the hospital administration. Sixty-four (19%) patients evaluated did not have capacity (as determined by IM physicians), necessitating further conversations with SDMs as per standard of care. Two hundred and sixty-three (80%) patients required one meeting (Table 3); 69 patients (20%) patients required another conversation lasting a median [interquartile range (IQR)] of 22 [15–32] min. Patients in both groups were similar with regards to initial resuscitation orders and resources needed for elicitation of resuscitation preferences by the trained nurses. Nevertheless, referred patients (group I) had a higher discordance (38% [63/165]) than randomly selected patients (group II) did (16% [27/164]; $P < 0.001$). Ninety-three percent (84/90) of patients with discordance expressed preferences for de-escalation of care (Tables 3, 4).

Identified discordances are characterized in Table 4. Of the 194 patients with an initial attempt resuscitation order, 42 (21%) preferred a care plan that did not involve CPR. Seventy percent (30/42) of these expressed preferences

Table 2 Patient demographics

Variable	Team referrals (n = 165)	Randomly selected (n = 164)
Age (yr); mean (SD)	80 (12.7)	80 (1.3)
Sex; Female n (%)	80 (48%)	86 (52%)
Charlson comorbidity score; mean (SD)	6.8 (2.6)	6.7 (2.5)
Clinical frailty score; mean (SD)	5.3 (1.4)	5.0 (1.4)
Discharge diagnosis; n (%)		
Pneumonia	45 (27%)	21 (13%)
Sepsis	18 (11%)	26 (15%)
CHF	13 (8%)	12 (7%)
COPD exacerbation	20 (12%)	27 (16%)
Malignancy	6 (4%)	2 (1%)
Delirium	4 (2%)	6 (3%)
Other	59 (36%)	70 (43%)
Source of admission; n (%)		
ER	152 (92%)	148 (90%)
Other hospital	9 (5%)	9 (5%)
Other	4 (2%)	7 (4%)
Last location of living prior to admission; n (%)		
Home	128 (78%)	127 (77%)
Retirement home	15 (9%)	18 (11%)
Long term care	8 (4%)	10 (6%)
Nursing home	10 (6%)	6 (4%)
Other	4 (2%)	3 (2%)
No. of ER visits in last year; median [IQR]	2 [1–3]	2 [0–3]
No. of hospital admissions in last year; median [IQR]	1 [0–2]	0 [0–2]
Length of hospital stay (days); median [IQR]	11 [5–28]	9.5 [5–2]
Marital status; n (%)		
Married	74 (45%)	62 (38%)
Widowed	57 (35%)	60 (37%)
Divorced or separated	13 (8%)	32 (20%)
Never married	20 (12%)	9 (6%)
	n = 164	n = 163
Highest education; n (%)		
Elementary school or less	48 (48%)	39 (27%)
High school graduate	29 (29%)	33 (23%)
Some college/trade	15 (10%)	22 (15%)
College diploma	22 (15%)	27 (19%)
Some university	5 (3%)	2 (1%)
University degree	18 (12%)	16 (10%)
Postgraduate	9 (6%)	3 (2%)
	n = 146	n = 142
Religious affiliation of the patient; n (%)		
Protestant	62 (44%)	74 (50%)
Catholic	38 (26%)	30 (20%)
Jewish	0	1 (1%)
Muslim	2 (2%)	0
Other	11 (8%)	14 (9%)

Table 2 continued

Variable	Team referrals (n = 165)	Randomly selected (n = 164)
None	29 (23%)	30 (20%)
	n = 142	n = 149
Religion influencing treatment decisions; n (%)		
Extremely important	10 (8%)	8 (6%)
Very Important	23 (19%)	19 (15%)
Somewhat important	19 (16%)	27 (21%)
Not very	19 (15%)	13 (10%)
Not at all	41 (34%)	52 (41%)
Don't know	10 (8%)	7 (6%)
	n = 122	n = 126

CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; ER = emergency room; IQR = interquartile range; SD =standard deviation. Complete data for all variables in this Table unless otherwise noted; percentages may not add to 100 because of rounding

were for care that would not involve an ICU admission (Tables 3, 4). Of the 36 patients initially designated do not attempt resuscitation (DNAR) advanced (i.e., admission to ICU if needed), 15 (41%) declined ICU care. Moreover, the proportion of patients who were originally designated DNAR restricted (i.e., did not want to go to ICU nor receive non-invasive ventilation) increased from 39/329 (11%) to 77/329 (23%) after the intervention. Healthcare teams applied the recommendations of the trained research nurses in 63/69 (91%) de-escalations—the difference for six patients being only the degree of de-escalation. Of the six patients who wanted escalation of their care plans, four wanted a limited period of resuscitation for reversible issues that could not be adequately captured on the resuscitation form and the intervention facilitated detailed documentation of preferences.

In a hypothesis-generating analysis, multivariable logistic regression showed that discordance was independently associated with increasing age (adjusted odds ratio [aOR], 1.05; 95% confidence interval [CI], 1.02 to 1.08 per additional year of age; $P < 0.001$), and team referral *vs* random selection (aOR], 3.92; 95% CI, 2.50 to 8.71; $P < 0.001$) (Table 5).

Discussion

Getting resuscitation preferences right is essential. Once a patient has been admitted to the ICU, it is often only the SDMs that can communicate the preferences of their loved ones to the healthcare team. This is particularly problematic because recent literature has suggested poor levels of communication between individuals and their SDMs.[26] Most participants believe that their SDMs would know their wishes, but are unable to describe any explicit conversations with them and simultaneously admit that they have not discussed any of these preferences with them.[26] Given that almost 30% of patients require ICU care in the last 30 days of life,[27] failure to document resuscitation status correctly can come at a great cost to the patient, the family, the provider, and the healthcare system.

This study highlights that the incidence of discordance between patients' expressed resuscitation preferences following a meaningful in-depth conversation of resuscitation options, and those documented in their medical records was quite high (16%) with the majority (93%) of patients indicating less invasive resuscitation preferences. Twenty-one percent of patients documented as preferring full resuscitation on their healthcare records expressed preferences for not receiving CPR. Forty-two percent of those documented for ICU care expressed preferences against it. While healthcare teams could recognize many patients who would benefit from more in-depth exploration of preferences, other randomly selected patients also showed discordance. Regardless, trained nurses could help elicit and reconcile resuscitation preferences in real-time.

Contributors to discordance are poorly described. Eliciting goals of care and resuscitation preferences is challenging in acute care settings, and trainees who are commonly entrusted to complete this task lack the education and experience.[28,29] Decision-making is also fraught with preference instability[30] as well as conflicts between values and treatment preferences.[31] Similar to our results, increasing age has been reported as an independent risk factor for discordance.[5,7] In contrast to other studies, however, factors such as frailty and a lack of SDM[5,7,13]

Table 3 Resuscitation preference conversation outcomes

Variable	Group I Team referrals (n = 165)	Group II Randomly selected (n = 164)	P value
No. of meetings with each patient; median [IQR]	1 [1–1]	1 [1–1]	0.81*
Total time duration of all meetings per patient (min); median [IQR]	60 [45–70]	60 [45–70]	0.55*
Time lag between admission and enrollment (days); median [IQR]	2 [1–7]	3 [1–5]	0.71
No. of patients where SDM was also involved in conversation	79/165 (48%)	55/164 (34%)	0.01
No. of patients with prior expressed wishes on resuscitation status/GOC/EOL choices	59/129 (45%)	65/146 (44%)	0.78
No. of patients where resuscitation form was completed by healthcare team prior to intervention	162/165 (98%)	163/164 (99%)	0.52
Resuscitation status pre-intervention			
Attempt resuscitation	97/165 (59%)	97/164 (59%)	1.0
DNAR	68/165 (41%)	67/164 (41%)	
DNAR category pre-intervention			
DNAR advanced	13/68 (19%)	23/67 (34%)	0.11
DNAR basic	35/68 (51%)	25/67 (37%)	
DNAR restricted	20/68 (29%)	19/67 (28%)	
Comfort care	0	0	
Resuscitation status post intervention			
Attempt resuscitation	71/165 (43%)	86/164 (52%)	0.016
DNAR	94/165 (57%)	78/164 (48%)	
DNAR category post intervention			
DNAR advanced	14/94 (15%)	20/78 (26%)	0.25
DNAR basic	29/94 (31%)	21/78 (27%)	
DNAR restricted	43/94 (46%)	34/78 (44%)	
Comfort care	8/94 (9%)	3/78 (4%)	
Discordances	63/165 (38%)	27/164 (16%)	< 0.001
Resultant change in goals of care			
Escalation	5/63 (1.6%)	1/27 (3.3%)	0.66
De-escalation	58/63 (98.3%)	26/27 (86.6%)	
No. of patients where resuscitation status was not readdressed after discordance was identified	13/63 (21%)	8/27 (30%)	0.42

DNAR = do not attempt resuscitation; GOC = goals of care; EOL = end-of-life, IQR = interquartile range; *Mann–Whitney U test; SD = standard deviation; SDM = shared decision making. Categorical variables were analyzed using Fisher's exact test; Percentages may not add to 100 because of rounding

were not associated with discordance in this study. Nevertheless, this study adds to the literature in a key way. Referrals from the healthcare teams were the strongest independent predictor of discordance (aOR, 3.92). We believe that the healthcare teams likely had valuable clinical context about their patients and, hence, their referrals might lead to inclusion of patients with higher discordance (Table 3). Less clear were the case features that would have triggered this recognition. Was it simply patients whom the team disagreed with their initially expressed choices or were there other features raising their concerns? Answering this question is important so that the teams can better target conversations to those who need them most. With increasing complexity of patients being admitted to Canadian hospitals[32] and their high risk of requiring ICU care with life-sustaining interventions,[33] reducing discordance should be a high priority for improving health services. Given that discordance was still noted in randomly selected patients (group II) in our setting, it would be premature at this stage to restrict conversations to those solely identified by the team.

Although recognized as important, in-depth resuscitation conversations are often suboptimal in clinical settings.[34] Time constraints may be a barrier.[35,36] Our data supports this notion since > 10% of patients in

Table 4 Identified discordances

Patients' expressed wishes (post intervention)	Documented resuscitation preferences by healthcare team (pre-intervention)				Total
	Attempt resuscitation	DNAR advanced	DNAR basic	DNAR restricted	
Attempt resuscitation	*152	0	#5	0	157
DNAR advanced	12	*21	0	#1	34
DNAR basic	10	6	*34	0	50
DNAR restricted	19	9	17	*32	77
Comfort care	1	0	4	6	11
Total	194	36	60	39	329

Documented resuscitation preferences by healthcare teams (pre-intervention) in columns compared with patients' expressed wishes in rows (post intervention). *Overall, a total of 239/329 patients were ordered goal-concordant care by the healthcare teams (pre-intervention). Of the 194 patients designated 'attempt resuscitation' by the healthcare team (pre-intervention), only 152 patients were found goal-concordant post intervention. Instead, 12, 10, 19, and 1 patients preferred DNAR advanced, basic, restricted, and comfort care, respectively. Similarly, out of 36 and 60 patients designated initially as DNAR advanced and basic respectively, only 21 and 34 patients were found goal-concordant, respectively. # 6/90 discordant patients were found to prefer escalation of care plans post intervention

DNAR = do not attempt resuscitation

this study still remained in the 'default attempt resuscitation' category (valid only for 24 hr at our institution; Table 1)[25] for a median of three days after admission. While improving the ability of physicians and medical trainees to have these conversations is important, in today's busy practice, it may not be feasible for them to independently hold in-depth conversations with all patients requiring them. This study shows that dedicated nurses with appropriate training can effectively elicit and facilitate reconciliation of resuscitation preferences. While we have not formally presented data on acceptance, the nurses were welcomed onto the teams; their recommendations led to changes in resuscitation orders in the majority of cases, and the hospital created a new nursing position to continue this work. The Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments (SUPPORT)[37] attempted similar interventions with less apparent success. Nevertheless, since SUPPORT, noticeable changes have occurred as most hospitals now mandate documentation of resuscitation preferences for nearly all admitted patients. Furthermore, research nurses in SUPPORT were not integrated into the healthcare teams and their communication objectives were different.[38]

Further research is needed. First, the contextual situatedness of the work requires that it be assessed in other settings. Regulatory guidelines that recommend how and when resuscitation preferences should be elicited and reconciled in the acute care setting will provide a useful benchmark, as will clarification of terminology and legal framework in the Canadian context. While the intervention itself is likely reproducible, the authors strongly believe that those having the conversation should be able to communicate well with healthcare teams as well as with patients. Second, cost-effectiveness analyses are required to quantify the impact of reconciling this discordance. Finally, future studies might want to explore how else to identify patients at risk of discordance so that scarce resources can be targeted towards those most needing them.

This study has limitations. First, we were unable to determine if the discordance was purely based on the quality or timing of initial discussion versus those that may have arisen through emerging information about diagnosis and prognosis. Physician bias has traditionally supported choices to limit treatment options towards end-of-life (EOL) per se rather than fulfillment of individual patient preferences.[39] This could have been interpreted as discordance. Furthermore, preference instability[27] or response shifts[40] (changing internal standards, values, conceptualization of quality of life and preferences for EOL over time) following admission might have reflected decision conflicts[26] or increasing adaptability to changing health status,[41,42] but identified as discordance. Second, there were a small number of patients where discordance was not resolved in favour of the preference identified by the nurses. Study data (not shown) suggests that most of these patients were discharged soon after the recommended change and we wonder if teams were simply too busy to address a low likely event on a soon to be discharged patient. Third, budgetary limitations made it necessary to limit the study sample to English-speaking individuals. This study was not discriminatory in that it was an

Table 5 Exploratory multivariable logistic regression using discordances as the dependent variable and *a priori* covariates as the independent variables

Variable	Adjusted odds ratio (95% CI)	*P*
Sex of patient		
Male	1.04 (0.69 to 2.41)	0.81
Female	Ref	
Age of patient (for each year increase in age)	1.05 (1.02 to 1.08)	< 0.001
Month of admission		
July to September	Ref	
October to December	1.01 (0.44 to 2.31)	0.81
January to March	1.22 (0.57 to 2.31)	0.78
April to June	1.55 (0.64 to 3.79)	0.98
Time of admission		
08:00 to 16:59	Ref	
17:00 to 23:59	1.31 (0.61 to 2.84)	0.71
00:00 to 07:59	1.34 (0.61 to 2.98)	0.73
Marital status		
Married	Ref	
Widowed	0.67 (0.32 to 1.38)	0.28
Never married	1.83 (0.61 to 5.55)	0.28
Separated or divorced	1.43 (0.54 to 3.77)	0.72
Charlson Comorbidity Index (for each one-point increase)	1.11 (0.98 to 1.26)	0.09
Frailty score (for each one-point increase)	1.20 (0.98 to 1.47)	0.09
Referral source		
Team referral	3.92 (2.50 to 8.71)	< 0.001
Random selection	Ref	
Substitute decision-maker or other family member involved in conversation		
No	Ref	
Yes	1.18 (0.65 to 2.14)	0.56
Highest education level		
High school or less	Ref	
Some college/college diploma	1.03 (0.53 to 2.04)	0.44
University degree OR postgraduate education	1.02 (0.46 to 2.22)	0.84

Religion dropped because of collinearity and missing data on 38 patients; 41 patients missing data for highest education attained; $n = 287$). Hosmer–Lemeshow goodness of fit $P = 0.053$; C-statistic = 0.74. CI = confidence interval

innovation to explore and improve on current practice. Since this innovation has now become part of normal practice, if an interpreter is needed, the nurse in the current role will obtain the interpreter. We recognized this retrospectively, and would handle this differently in future studies. It is important to note though that being excluded from the study did not mean that patients did not receive more in-depth conversations; only that those conversations were handled by the healthcare teams as per the standard of care. It is recognized that the demographics of the trained nurses as well as participants may have influenced decision-making. Lastly, our 'random' sample was not truly random because surnames were unequally distributed, and the regression model, which identified putative risk factors for discordance, was undoubtedly affected by residual confounding and should be interpreted with caution. Its purpose was for generating hypotheses about potentially important factors predicting discordance; it was not intended, nor does it serve, as a definitive analysis.

Conclusions

Revisiting resuscitation preferences and having effective conversations in the acute care setting can yield a

discordance between patients' expressed resuscitation preferences and those documented in the medical records at admission. Internal medicine teams may not be able to identify all their inpatients at risk of discordance. Once identified, trained nurses can help elicit values and beliefs and reconcile the discordance in real-time. Further research is necessary to evaluate this intervention in the broader clinical setting.

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