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Inpatient Understanding of Their Care Team and Receipt of Mixed Messages: a Two-Site Cross-Sectional Study

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ABSTRACT

BACKGROUND: Patient understanding of their care, supported by physician involvement and consistent communication, is key to positive health outcomes. However, patient and care team characteristics can hinder this understanding.

OBJECTIVE: We aimed to assess inpatients' understanding of their care and their perceived receipt of mixed messages, as well as the associated patient, care team, and hospitalization characteristics.

DESIGN: We administered a 30-item survey to inpatients between February 2020 and November 2021 and incorporated other hospitalization data from patients' health records.

PARTICIPANTS: Randomly selected inpatients at two urban academic hospitals in the USA who were (1) admitted to general medicine services and (2) on or past the third day of their hospitalization.

MAIN MEASURES: Outcome measures include (1) knowledge of main doctor and (2) frequency of mixed messages. Potential predictors included mean notes per day, number of consultants involved in the patient's care, number of unit transfers, number of attending physicians, length of stay, age, sex, insurance type, and primary race.

KEY RESULTS: A total of 172 patients participated in our survey. Most patients were unaware of their main doctor, an issue related to more daily interactions with care team members. Twenty-three percent of patients reported receiving mixed messages at least sometimes, most often between doctors on the primary team and consulting doctors. However, the likelihood of receiving mixed messages decreased with more daily interactions with care team members.

CONCLUSIONS: Patients were often unaware of their main doctor, and almost a quarter perceived receiving mixed messages about their care. Future research should examine patients' understanding of different aspects of their care, and the nature of interactions that might improve clarity around who's in charge while simultaneously reducing the receipt of mixed messages.

BACKGROUND

Hospitalization represents a major life event that can pose barriers to patient understanding of their care. For example, inpatients are frequently in an unfamiliar setting while unwell and must trust multiple clinicians on changing care teams to make decisions that will impact their well-being. Such dynamism and levels of complexity in the hospital setting can pose challenges to how well patients understand who is on their care team, their roles, and aspects of their care plan. Patients' understanding of their care is vital for patient-centered care and positive outcomes, such as overall patient experience scores.[1–5] Physician involvement and communication with patients is documented to increase their understanding of their care, playing an important role in patients' adherence to their care plan, and in turn, outcomes like readmission and self-evaluation of health.[2] While a lack of patients' understanding of their care is often conceptualized as detrimental to good health, further research is needed to examine the associated factors.[6,7]

Patients, especially those at older ages and with decreased cognitive ability, are much less likely to understand their care in the hospital environment.[8] With reduced participation in their care, patients are then likely to have worse outcomes.[9] Conversely, patients whose understanding of their care plan aligns with that of their clinicians have better outcomes, as they typically are more activated in their care and trust the clinicians caring for them.[10,11] From these findings, however, it is unclear whether aspects of the care team and hospitalization affect patients' understanding of their care.

Clinicians who function as an effective team and demonstrate skilled communication serve to facilitate patient

understanding. However, despite this fact, many studies have found little agreement among patient and clinician knowledge of patients' diagnoses, procedures, and medications,[12] indicating a gap between perceived communication and actual communication. In one study, physicians most commonly cited lack of time as a barrier to patient education and thus patient understanding.[13] Furthermore, communication breakdowns between primary care providers and specialists hinder both provider and patient understanding of their condition.[14]

Our research aims to explore specific aspects of the hospital context, and in particular, characteristics of the patient, care team, and hospitalization that relate to patients' understanding of their care. Specifically, we assessed: (1) how well inpatients recognize members of their care team; (2) when and how patients experienced mixed messages (i.e., conflicting information about aspects of their care) from those members; and (3) patient, care team, and hospitalization characteristics associated with patients' understanding of their care.

METHODS

Study Settings, Participants, and Data Collection

The study was conducted at two academic medical centers, UCSF Medical Center in San Francisco, CA, and Brigham and Women's Hospital in Boston, MA. We refer to these hospitals as site 1 and site 2 without specific reference to either hospital to protect their identities. Both hospitals are large, urban facilities with over 700 beds and serve diverse patient populations. Our study focused on the general medicine unit at each facility. At site 1, patients are cared for by one attending at any given time, and by either one physician assistant (PA) or by one intern and one senior (second or third year) resident. Patients usually do not encounter the other members of their primary care team (e.g., a second PA or a second intern). At site 2, patients were either assigned to a teaching team (one attending, one senior resident, and one intern) or direct care service (hospitalist working by themselves). At both sites, medical students may have been present on the resident teams.

We designed a survey instrument in REDCap (Nashville, TN), which was refined after consulting relevant literature, cognitive testing with a patient and family advisory council, and pilot testing with 14 inpatients. Six hospitalist physicians and two other members of our study team at the two hospitals administered surveys either in-person using a digital tablet or by phone to randomly selected inpatients who were admitted to general medicine services and who were on or past the third day of their hospitalization. Additionally, patients were at least 18 years of age and non-prisoners. We provided trained interpreters for non-English-speaking patients. Data collection began in February 2020; due to the COVID-19 pandemic, enrollment was slower than anticipated, such that data collection extended into November 2021 to achieve an adequate sample size. To choose the patients in our sample, we used a random number generator in Microsoft Excel (Redmond, WA) to sort eligible patients for each day of data collection and then approached patients in that order as surveyor time allowed.

The survey comprised 30 items, which included Likert scale, yes/no, and open-ended questions pertaining to three main areas (see Appendix 1 for the complete survey): (1) patients' knowledge of their inpatient care team during their hospital stay (e.g., if they were aware of who their main doctor "in charge of [their] care in the hospital" was, if they would recognize their main doctor, their understanding of roles and responsibilities of various care team members); (2) information patients received about their care during that stay (e.g., the frequency and types of visits they received from care team members, if and about what topics they received conflicting information or "mixed messages"); and (3) patients' perceptions of the overall care they received (e.g., if they had a good understanding of the care they received, their rating of care coordination, suggestions for how to clarify who is in charge of their care, and the roles and responsibilities of care team members).

Main Outcomes and Measures

We collected patient-level and hospitalization data from electronic health records. The main outcome variables came from our survey and were dichotomized: awareness of main doctor was either "yes" or "no/don't know/unsure," recognition of main doctor was either "yes" or "no/don't know/unsure," and frequency of mixed messages was either "Rarely/never" or "At least sometimes" (i.e., sometimes, usually, or always). Patient and hospital encounter characteristics were extracted from the patient's electronic medical record to evaluate their association with these outcomes. These covariates included mean clinician notes per day, number of consultants involved in the patient's care, number of unit transfers, number of attending physicians, length of stay in days, age, sex, insurance type, and race. Mean notes per day included electronic documentation from a range of care team members (e.g., nurses, therapists, advanced practice providers, physicians). This variable was used as a proxy for daily patient contact and interaction with members of the care team, capturing the number of clinicians caring for a patient on a given day, while the number of consultants and number of attendings variables indicates the number of care providers coming in contact with a patient over the duration of their hospitalization. We also included a measure related to the complexity of the patient's condition, specifically the van Walraven Elixhauser comorbidity score for each patient.[15]

Analysis

We conducted cross-sectional analysis to examine factors associated with inpatients' understanding of various aspects of their care. We first used descriptive statistics across both study sites to examine patient characteristics, how well inpatients were aware of and recognized members of their care team, and whether they had experienced mixed messages; we also performed *t*-tests and chi-square tests to compare each site's study sample to their population of total admissions during our study period (i.e., to look for selection bias). We then applied multivariable logistic regression to analyze the effect of patient, care team, and hospitalization characteristics on knowledge of patients' main doctor and frequency of perceived mixed messages. Each model contained all the sociodemographic and encounter-level covariates described above. A two-sided significance level of 0.05 was used, although we also noted weakly significant relationships at the *p* < 0.1 level. Additionally, we conducted sensitivity analyses by site to examine whether regression results would differ based on the specific context, since there are noted differences between hospital sites included in our study. All analyses were conducted in STATA statistical software, version 17.0 (College Station, TX: Stata Corp LP). A power calculation done prior to enrollment showed that a sample size of 190 would provide 80% power (with an alpha of 0.05) to detect a change in outcome (e.g., awareness of their main doctor) from 50% in the absence of a factor to 70% in the presence of that factor (odds ratio 2.3), assuming the factor was present in half the sample.

The study was approved by the institutional review boards (IRBs) of both participating hospitals. Patient consent was implied by completion of the surveys after being given a one-page information sheet about the study. We also received IRB approval to collect basic demographic information of non-surveyed patients (without consent) to look for selection bias, as above.

RESULTS

Data were collected for 190 total participants (111 at site 1 and 79 at site 2). Of these patients, 172 (91%; 96 at site 1 and 76 at site 2) completed surveys while 18 patients declined to participate (i.e., only had patient- and encounter-level data available). Table 1 shows descriptive statistics for patient-level and hospitalization characteristics at each site and aggregated across both sites. Patients had a median of 4 attending physicians, 3 consultants, and almost 6 notes per day. Approximately half of the patients were 65 years old and over, were male, and had Medicare insurance; approximately two-thirds of patients were white. Surveyed patients did not significantly differ from the total populations of patients admitted to general

Table 1 Descriptive Statistics for Patient and Hospitalization Characteristics Across All Sites

	Total Median, [IQR]	Site 1 Median, [IQR]	Site 2 Median, [IQR]
Hospitalization characteristics			
Number of attending physicians	4 [3]	4 [2]	6 [4]
Number of consultants	3 [4]	3 [3]	5 [6]
Notes per day	5.7 [2]	6.25 [1.6]	4.2 [1.3]
Number of unit transfers	1 [1]	1 [1]	1 [1.3]
Length of stay (days)	7.8 [10.5]	6.2 [6.0]	13.9 [13.2]
van Walraven score	13.5 [18.0]	10.0 [15.0]	16.5 [18.0]
	Total *n* (%)	Site 1 *n* (%)	Site 2 *n* (%)
Patient characteristics			
Age			
Under 65	91 (48)	52 (47)	39 (51)
65 and over	97 (52)	59 (53)	38 (49)
Sex			
Male	78 (48)	40 (42)	38 (55)
Female	86 (52)	55 (58)	31 (45)
Race			
White or Caucasian	104 (64)	67 (72)	37 (54)
Black or African American	31 (19)	21 (23)	10 (14)
Asian	14 (9)	1 (1)	13 (19)
American Indian or Alaska Native	2 (1)	0	2 (3)
Other	11 (7)	4 (4)	7 (10)
Insurance			
Medicare	84 (51)	48 (50)	36 (52)
Medicaid	34 (21)	11 (12)	23 (33)
Other government	2 (1)	0	2 (3)
Private	44 (27)	36 (38)	8 (12)

Note: Patients were not required to respond to each question. Some missing values resulted in differences in the sample size across survey items: age, *n* = 188; sex, *n* = 164; race, *n* = 162; and insurance, *n* = 164

medicine services at both sites in most characteristics except for length of stay, where site 1's sample mean was lower than its population mean by almost 3 days, and site 2's higher by almost 11 days (Appendix 2).

Patient responses to survey questions are shown in Table 2. Overall, most patients (59%) were unaware of or did not know if they were aware of their main doctor. Of those patients, the majority (75% at site 1, 59% at site 2, and 70% overall) also marked that they would not recognize or were unsure if they could recognize their main doctor.

Table 2 Responses to Select Survey Questions Across Sites and at Each Site

	Total n (%)	Site 1 n (%)	Site 2 n (%)
Survey questions			
Are you aware of who the main doctor in charge of your care in the hospital is?			
No	79 (46)	55 (57)	24 (32)
Don't know or unsure	23 (13)	11 (12)	12 (16)
Yes	70 (41)	30 (31)	40 (53)
Would you recognize your main doctor if you saw them?			
No	46 (46)	34 (53)	12 (32)
Don't know or unsure	24 (24)	14 (22)	10 (27)
Yes	31 (30)	16 (25)	15 (41)
During this hospital stay, how often do you feel you received conflicting information from the members of your care team?			
Always	5 (3)	1 (1)	4 (5)
Usually	4 (3)	1 (1)	3 (4)
Sometimes	29 (17)	16 (17)	13 (18)
Rarely	31 (18)	10 (10)	21 (28)
Never	100 (59)	68 (71)	32 (44)
Which members of your care team gave you conflicting information? *(percentage of respondents receiving mixed messages)*			
Between doctors on the primary team and consulting doctors	23 (33)	13 (46)	10 (24)
Between doctors and nurses	13 (19)	6 (22)	7 (17)
Between attending doctors and residents	7 (10)	4 (14)	3 (7)
Other	5 (7)	2 (7)	3 (7)
Don't know or unanswered	21 (30)	3 (11)	18 (44)
About which of the areas below did you receive conflicting information? *(multiple responses permitted; percentage of respondents receiving mixed messages)*			
Medications	17 (25)	9 (32)	8 (20)
Procedures	16 (23)	6 (21)	10 (24)
Diagnosis	15 (22)	8 (29)	7 (17)
What to expect	14 (20)	5 (18)	9 (22)
Follow-up plans	13 (19)	5 (18)	8 (20)
Discharge location or timing	10 (14)	2 (7)	8 (20)
Please tell me how much you agree with this statement: I have a good understanding of the care that I am receiving			
Strongly disagree	1 (<1)	1 (1)	0
Disagree	8 (5)	4 (4)	4 (6)
Neither agree nor disagree	5 (3)	5 (5)	0
Agree	76 (46)	41 (43)	35 (51)
Strongly agree	75 (45)	45 (47)	30 (43)
Overall, how would you rate the quality of care coordination during your hospitalization?			
Poor	8 (5)	2 (2)	6 (8)
Fair	14 (8)	7 (8)	7 (10)
Good	43 (26)	32 (34)	11 (15)
Very good	53 (32)	27 (28)	26 (37)
Excellent	48 (29)	27 (28)	21 (30)

Across both sites, 23% said they had received conflicting information or mixed messages at least sometimes. When present, the most common source of mixed messages was between doctors on the primary team and consulting doctors, followed by mixed messages between doctors and nurses and between attending doctors and residents; the most common topics for mixed messages included medications, procedures, diagnosis, what to expect, follow-up plans, and discharge location or timing. Despite these mixed messages, most participants responded positively to global ratings of their understanding: 91% of patients agreed or strongly agreed that they had a good understanding of the care they were receiving, and 87% of patients rated their care coordination as good, very good, or excellent. We note similar results when looking at each hospital site individually.

Table 3 shows the results from multivariable analyses of patient and hospital encounter characteristics on awareness of main doctor, recognition of their main doctor, and reported receipt of mixed messages at least sometimes. With each additional note written per day, patients were less likely to know their main doctor (adjusted odds ratio (AOR) 0.72, 95% CI [0.53, 0.97], $p < 0.05$), but with each additional unit transfer, patients were more likely to know their main doctor (AOR 1.64, 95% CI [1.01, 2.68], $p < 0.05$). With each additional note per day, patients were less likely to report receipt of mixed messages (AOR 0.64, 95% CI [0.45, 0.90], $p < 0.05$). Furthermore, patients with private insurance were more likely to report receipt of mixed messages. Although weakly significant, with each increasing consultant involved, patients had a 1.25 (95% CI [0.99, 1.57], $p < 0.10$) increased odds of reporting mixed messages. When analyzing the outcome of whether patients recognized their main doctor, we did not note any significant results. Sensitivity analyses of these results by site did not indicate a significant difference from the obtained results (Appendices 3 and 4).

DISCUSSION

In this two-site cross-sectional study, the majority of surveyed patients admitted to general medicine services were unaware or unsure of who their main doctor was, and almost a quarter of patients reported receipt of mixed messages about their care. Some patient, care team, and hospitalization characteristics were associated with these outcomes, including the expected finding that more notes per day (indicative of more care team members) was negatively associated with awareness of their main doctor, and the unexpected finding that more notes per day was negatively associated with perceived receipt of mixed messages.

Hospitals and hospital care can be bewildering for many patients, with large and complex care teams. For the patients in our sample, in most cases, the doctor in charge of their care was a hospitalist; despite being the fastest growing specialty in the history of medicine,[16] it is likely that most

Table 3 Multivariate Logistic Regression Results of Survey Outcomes on Patient, Team, and Hospitalization Characteristics

		Awareness of main doctor	
		Odds ratio [95% confidence interval]	*p* value
Patient encounter details			
Mean notes per day		0.72 [0.53, 0.97]	0.03*
Number of consultants involved		0.90 [0.74, 1.10]	0.30
Number of unit transfers		1.64 [1.01, 2.68]	0.05*
Number of attending physicians		1.02 [0.77, 1.34]	0.91
Length of stay (days)		0.99 [0.91, 1.09]	0.90
Patient demographics			
Age (relative to under 65)	65 and over	0.78 [0.32, 1.92]	0.59
Sex (relative to male)	Female	1.22 [0.56, 2.69]	0.62
Insurance (relative to government-funded, or Medicare and Medicaid)	Private	0.89 [0.35, 2.26]	0.81
Primary race (relative to white)	Black/African American	0.95 [0.35, 2.59]	0.92
	Asian	0.40 [0.06, 2.62]	0.34
		Recognition of main doctor	
		Odds ratio [95% confidence interval]	*p* value
Patient encounter details			
Mean notes per day		1.24 [0.94, 1.64]	0.13
Number of consultants involved		1.10 [0.91, 1.38]	0.32
Number of unit transfers		.716 [0.45, 1.14]	0.16
Number of attending physicians		1.00 [0.77, 1.32]	0.93
Length of stay (days)		0.96 [0.88, 1.05]	0.41
Patient demographics			
Age (relative to under 65)	65 and over	1.48 [0.62, 3.57]	0.38
Sex (relative to male)	Female	0.85 [.40, 1.83]	0.68
Insurance (relative to government-funded, or Medicare and Medicaid)	Private	1.03 [.42, 2.54]	0.95
Primary race (relative to white)	Black/African American	1.26 [0.46, 3.41]	0.65
	Asian	1.84 [0.35, 9.60]	0.47
		Frequency of mixed messages	
		Odds ratio [95% confidence interval]	*p* value
Patient encounter details			
Mean notes per day		0.64 [0.45, 0.90]	0.01*
Number of consultants involved		1.25 [0.99, 1.57]	0.06†
Number of unit transfers		0.87 [0.51, 1.51]	0.63
Number of attending physicians		0.86 [0.61, 1.21]	0.39
Length of stay (days)		0.98 [0.89, 1.09]	0.76
Patient demographics			
Age (relative to under 65)	65 and over	2.44 [0.80, 7.45]	0.12
Sex (relative to male)	Female	0.73 [0.28, 1.89]	0.52
Insurance (relative to government-funded, or Medicare and Medicaid)	Private	3.55 [1.13, 11.14]	0.03*
Primary race (relative to white)	Black/African American	0.92 [0.25, 3.39]	0.91
	Asian	0.84 [0.11, 6.18]	0.86

*$p < 0.05$ level; †$p < 0.1$

patients still do not know what a hospitalist is.[17] We do not know how the hospitalist attendings introduced themselves to patients (e.g., hospitalist, attending physician), but these terms may not mean much to many patients. Furthermore, teaching attendings, especially in academic medical centers, may want to flatten the hierarchy and ensure that trainees are seen as the primary providers for their patients; they thus may avoid phrases such as "I am the doctor in charge of your care." Neither site provides patients with an "organizational chart" explaining the members of the care team or how they relate to each other, and neither provides formal training to physicians on how to introduce themselves.

Regarding mixed messages, one surprising finding was that the rate of perceived mixed messages was not higher than our results indicated. Surveyed patients had on average

three consultants, and consulting physicians, usually fellows, round independently of the primary team, and routinely see patients before documenting their plans or talking directly with the primary team. Feeling an obligation to communicate with their patients, they likely convey their opinion of the care plan without verifying that the primary team (and their supervising physician and other consultants) agree with that plan. Similarly, nurses communicate with patients throughout the day, while they may only communicate with the primary team during morning rounds (and even on rounds, studies show that communication is suboptimal), thus leading to many opportunities for disparate care plans across team members.[18] Nurse and physician opinions of the care plan may differ, stemming from discordance in the care delivery mental models between roles.[19]

Interestingly, despite our findings indicating that patients experienced mixed messages, most patients still said they understood their care and care coordination was at least good. It seems patients do not perceive the inability to identify their main doctor or the receipt of mixed messages as problematic in terms of how well their care team members work together and whether they understand their care during hospitalization. Future studies may examine what inpatients define as good quality, well-coordinated care. Along these lines, while patients generally appreciate and would benefit from consistent communication, we do not believe that mixed messages should be avoided at all costs if that discourages healthy discussion or leads to less communication with patients. Further work is needed to optimize communication among complex care teams and patients in ways that foster patient understanding and engagement.

Perhaps some of the unexpected or paradoxical findings can also be explained. A transfer from one hospital unit to another, while disruptive, may provide an opportunity for the new care team to introduce themselves to the patient and explain their roles. Number of notes per day may be associated with medical complexity and perhaps decreased ability of patients to even be aware that they are receiving mixed messages (e.g., due to factors such as cognitive impairment). More notes (as opposed to more consultants) may also mean better written communication and a chance for the care team to "get on the same page." Conversely, private insurance may be associated with increased affluence, education,[20,21] and health literacy– and therefore increased awareness of receipt of mixed messages. The general lack of associated factors in our study may be due to small sample size, or it may reflect the fact that effective patient communication is largely idiosyncratic and dependent on the individual care team members and unmeasured patient factors such as health literacy.

Although health literacy has varying definitions, it almost uniformly involves an individual's personal abilities and environmental circumstances that allow them to gain, understand, and utilize information to be engaged in their care.[22] In this study, we focus on the aspect of health literacy that encompasses patients' understanding of their care. Much of the extant literature emphasizes improving communication between providers and patients to enhance patients' understanding but do not examine the ways in which the context of care can impact patients' understanding.[7] We have expanded the analysis to look at team structure and characteristics of the hospitalization that relate to patients' understanding of their care while hospitalized. In doing so, we provide insight into possible operational enhancements for facilitating patient understanding of their care.

Our study has several implications. First, more observational and qualitative research is needed to better understand the mechanisms of our findings. This could include direct observations of how clinicians introduce themselves, how patients are oriented to the ways hospitals work, and

how specialists convey their recommendations. It may also include more in-depth interviews with patients and caregivers regarding their understanding of different aspects of their inpatient care. Second, our findings suggest potential solutions to some of the problems identified in this study. For example, medicine services could provide a document to patients explaining the various roles of providers in the hospital and how they relate to each other. This could be complemented with a "digital white board" that provides names, photos, and roles of all the current members of a patient's care team. More work is likely needed to determine and spread best practices regarding consultant communication of their recommendations to patients. Dissemination of best practices in physician-nurse communication (e.g., regionalization,[23] interdisciplinary bedside rounds[24–26]) is also needed; the same is true for effective communication with patients with low health literacy.[27] There may also be a role for high-tech solutions to improve communication among all the members of a care team, such as patient-centered microblogs.[28]

These implications should be viewed in light of the study's limitations. Our small sample size and study sites of two urban teaching hospitals limit the generalizability of our findings, as patients and clinicians at other hospitals could have different experiences. The small sample size could have also limited our ability to detect other patient and encounter associations with our study outcomes. We did not directly measure health literacy, physician-level characteristics, or other potential mediators of our findings. In addition, there could be social acceptability bias in patients' responses, resulting in the high global ratings of patients' understanding of their care. Our results may also have been affected by selection bias. In particular, the sample at site 2 had a very long length of stay, likely due to availability (e.g., higher likelihood of being available to be surveyed). This could have skewed the results by enriching the sample for patients with more providers, more consultants, and possibly higher medical complexity. However, we did not notice significant difference in our sensitivity analyses by site. An additional limitation was that we did not use a validated survey but did refine it through cognitive testing with a patient advisory council and pilot testing with several inpatients. Last, we dichotomized the outcome variables (patients' awareness of their main doctor and frequency of mixed messages received), which may have limited our analysis in its ability to capture subtle effects across categorical responses. In dichotomizing certain variables, we sought to simplify the analysis and produce more interpretable findings, choosing cutpoints that were felt to be clinically meaningful and also produced relatively balanced groups for analysis. Since the data was distributed in a way that supported our cutoffs, we believe the decision was analytically appropriate.

To conclude, our study found high rates of patient lack of understanding of their care team and moderate rates of

perceived mixed messages, with both factors strongly related to the number of care team members patients interacted with on a daily basis: the more interactions, the less likely patients knew who was in charge of their care but the fewer mixed messages patients experienced. Further work is needed to better understand the mechanisms of these findings and to develop, implement, and evaluate interventions to improve the quality and consistency of patient communication in the hospital.

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Declarations:

Conflict of Interest *The authors declare that they do not have a conflict of interest.*

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