

How Do Students Enact Group Reasoning Within Online Interprofessional Education?

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Abstract

Background: The capability of an interprofessional healthcare team to reach a shared understanding through group reasoning is critical to good healthcare delivery. Models for clinical reasoning have proved useful but remain focused on individual cognitive processes. Whilst interprofessional education has steadily gained real-world traction, it is unclear how interprofessional student groups practice group reasoning when performing online tasks.

Method: We analyzed the group reasoning processes with two teams of health professional students in an online interprofessional education task ($n = 13$). Two simulated interprofessional team meetings about a palliative case were audio recorded, transcribed, and deductively analyzed to determine the mechanisms of team deliberation using a previously published study of group reasoning.

Results: The reasoning mechanisms outlined in a previous study (information-accumulating, sense-making, and decision-making) were evident in an analysis of student group reasoning. In particular, students focused on sharing and agreeing on information, and to a lesser extent, recording information.

Conclusion: Attention to the mechanisms of action may be useful to facilitate teaching interprofessional reasoning. Group reasoning may benefit from focusing student attention on these stages: 1) *prioritizing and sequencing* of options, methods for *exposing agreement* about shared information, shared *understanding of the situation*, and options; 2) techniques for *critically evaluating information* so that opportunities arise to identify when information may disrupt existing understandings; and 3) development of *documentation* tools to assist recording of the process.

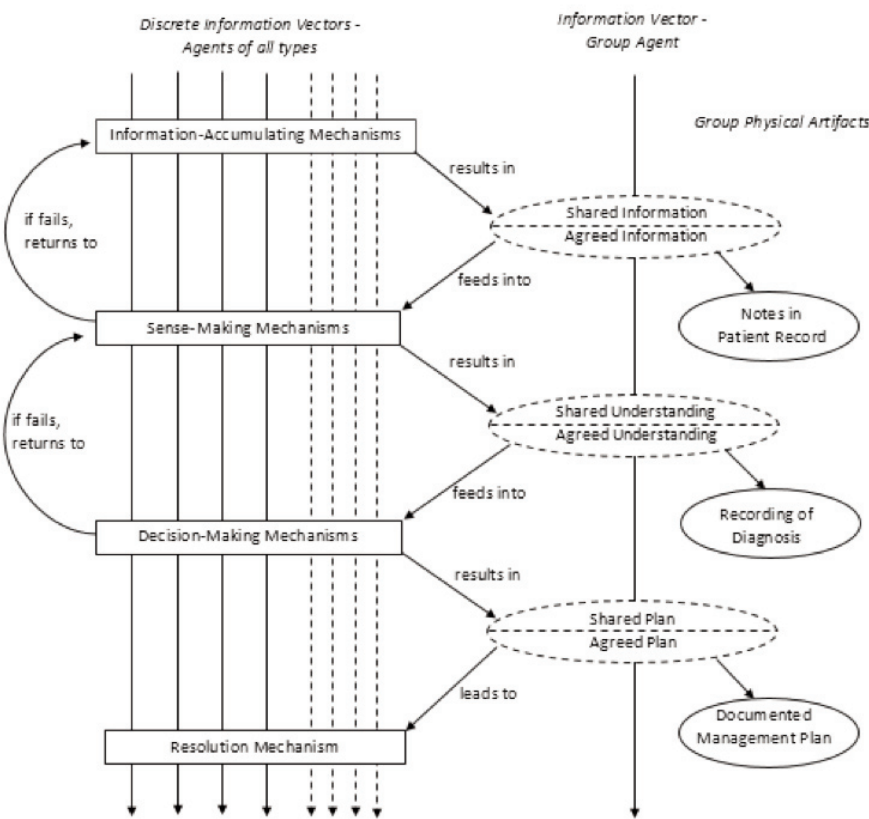
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Introduction

Contemporary models of healthcare are increasingly interprofessional in structure, so health professional education must equip graduates with the skills of collaborative practice. Interprofessional collaborative practice refers to a model of working that involves a partnership between a team and patients in a participatory, collabo-

orative, and coordinated approach with shared decision-making, to deliver the highest quality of care [1]. However, the precise mechanisms that enable interprofessional teams to enact shared decision-making are not well understood, and therefore, not commonly taught.

Multiple models of clinical reasoning have been proposed, such as the balance of heuristic methods with analytical, systematic processes [2,3]. Yet, differences in clinical reasoning processes exist both within and between the different health professions [3,4]. If group decision-making is an expected competency of health professional graduates, it should be taught in a declarative way. The features of interprofessional shared decision-making have been described in the literature as: equipoise (recognize and identify the decision to be made), knowledge transfer and exchange, expression of values and preferences, deliberation, decision, and implementation [5], and a recent literature review on the topic suggests that using a framework may assist the process of teaching interprofessional reasoning [6]. A concept called the “clinical reasoning cycle,” has been established in nursing, but has since been applied in interprofessional education to assist group reasoning [7]. The cycle proposed in this model consists of: collect



cue, process the information, come to an understanding of a patient problem or situation, plan and implement interventions, evaluate outcomes, and reflect on and learn from the process.

Existing models of interprofessional reasoning warrant exploration across clinical and cultural contexts [8]. A set of group reasoning mechanisms was proposed by Perversi et al. [9] through an evaluation of group decision-making on hospital ward rounds [10]. The mechanisms were inductively formulated through an analysis of hospital ward rounds in Australia, where group reasoning sought to propose a plan for patient care. The study articulated how the mechanisms of collaborative group reasoning bring together information existing within individuals to produce group information artefacts.

Figure 1. Structure of the collaborative group reasoning mechanisms (reproduced from Perversi, 2019) [9,10]

Nine group reasoning mechanisms were identified within the ward round setting, under the three broad categories of information-accumulating, sense-making, and decision-making. These were structured in a framework, as per Figure 1. This group reasoning process informed the initial theoretical lens for our research and offered

an opportunity to examine the progression towards decision-making in an interprofessional team meeting.

An authentic interprofessional discharge planning challenge was chosen to explore group reasoning. Like ward rounds, discharge planning team meetings are a common setting for interprofessional team decision-making as they occur in circumstances where a group of people who each know different things about the patient, the system, or the disease/s gather. Planned team meetings have also been proposed as a useful mechanism to facilitate team reasoning [8]. The “collision” of information that ensues must be re-organized, interpreted, and stratified to develop a collaborative plan of next steps. Clinical discharge team meetings are common practice in areas such as rehabilitation, aged care, mental health, and palliative care. We elected to investigate team decision-making within a palliative care context, because this presented a new curriculum opportunity across all the health professional courses in our faculty. Through exploring the relevance of the group reasoning mechanisms within an interprofessional student discharge planning meeting, we hoped to better understand its suitability for teaching and learning.

Given the centrality of collaborative interprofessional reasoning in healthcare practice, and hence the importance of training health professional students in effective group reasoning, the research question for the project was:

How does a team of healthcare students enact interprofessional reasoning in a discharge planning task, as interpreted through the exploration of group reasoning mechanisms?

Method

The interprofessional education intervention

The education intervention was undertaken in 2020 when the health faculty was under strict social distancing limitations to limit the spread of COVID-19. The module was a student co-design initiative and combined a series of asynchronous online tasks relating to an authentic palliative care patient, and a synchronous virtual team meeting. Preparatory tasks included reading about the patient, watching a recording of an authentic hospital interprofessional team meeting, listening to audio recordings from a consumer advocate and experts from each of the participating professions, and completing a hospital discharge proforma. Importantly, no group decisions or the patient’s discharge preference were made available in the exemplar team meeting video. Two synchronous interprofessional student group meetings then followed, hereafter referred to as T1 (Team 1) and T2 (Team 2), using the video conferencing platform Zoom. Students entered the Zoom room and were introduced to the session by two of the investigators, who subsequently closed their cameras so that students could deliberate uninterrupted. The task given to the student team was to discuss the discharge care plan and determine the input needed from respective professions for ongoing care. T1 students deliberated for 41 minutes and whilst T2 students deliberated for 59 minutes. The discussions were video recorded and audio transcribed. Data was stored within a shared secure university electronic drive, only accessible to the investigation team.

Participants

Student recruitment occurred through internal advertising and via the interprofessional academic lead from each health profession who extended an invitation to each of their respective cohorts. Participation was voluntary (extra-curricular), and students were either in their final year of study or had completed several clinical placements, with two students in the T2 group having had exposure to a palliative setting. Students undertaking both undergraduate and postgraduate pre-registration pathways were able to participate. Students representing dietetics (D), medicine (M), nursing (N), occupational therapy (OT), pharmacy (PH), psychology (PS), physiotherapy (PT), and social work (SW) participated. T1 consisted of seven female students whilst T2 consisted of five female students and one male. No student participated in both T1 and T2.

Data Analysis

The video conference recordings were viewed by all investigators, followed by a team meeting to share initial impressions of the reasoning mechanisms observed. One investigator then undertook line-by-line deductive coding of the audio transcription, according to the group reasoning mechanisms proposed in the Perversi et al. framework [9,10]. The transitions between the mechanisms were also coded to understand how the reasoning process was progressed by the student teams. Coding results were then presented back to the investigator team for discussion and minor edits to coding were undertaken. The total number of events under each domain (information-accumulating, sense-making, and decision-making) were then calculated and summarized in table form.

Ethics

An authentic palliative care team meeting was recorded with informed consent from all participants for use for education and research purposes. Informed consent was obtained by all students for recording of the Zoom meetings. Ethics approval was obtained from Monash University Human Research Ethics Committee (Project ID: 21066).

Results

The framework of group reasoning mechanisms proved to be a useful means for understanding the discrete steps undertaken within the interprofessional reasoning process. The three main mechanism areas of the framework—information-accumulating, sense-making, and decision-making—were clearly identified. Within each of the mechanism areas, a focus on sharing and agreeing on information was noted. To a lesser extent, discussions occurred about the recording of information. Another consideration concerned transitions between mechanisms and resolution.

Information-Accumulating

Information sharing was a focus in both student sessions. For T1, 26 of the 28 coded information events related to students sharing information, with nine of those related to information-seeking. For T2, 42 of the 46 coded information events related to sharing, with 19 related to information-seeking. Generative processes of

information-accumulating were common, as students discussed the case along themes, such as pain management, patient preferences, social situations, or medication. The remaining instances of information-accumulating related to information agreement. There were no coded instances regarding information recording, such as students mentioning that a piece of information should be noted in the plan.

Information sharing took a number of forms. Information was shared that was available to all the students through the case scenario:

She has some real duties in her family that she would like to fulfil, like caring for her mother. [PS]

Some students volunteered information from their personal experience:

Our discharge plans are usually ... communication with the GP, because that would be the person that would follow up in the community. [M]

Shared information was provided in response to other students seeking information:

Would there be anyone who ... would come into her home and visit her in her home so that she didn't have to go out from that religious community?" [PT] "Yes, there are a lot of services that you can get them linked in ... it's called Getting back into Society Group. [M]

Other information seeking statements involved questioning information gaps in the scenario, indicating that students were considering what further information they would seek.

Maybe figure out ... whether she had a previous diagnosis of vertigo. [M]

An example of an information generation process occurred regarding the issue of preferences around terminal illnesses. The nursing student initiated this process by making a point about communication:

Family members can be so shocked that their loved one just passed away, when the medical team knew but it just wasn't communicated well enough. [N]

Following this comment, the issue was discussed for a further nine minutes with several students seeking information from each other and providing information from their own experiences. One example involved a discussion about variations in communication practices across cultures:

That was a similar experience to what I had, and I wasn't at the hospital at the time, but they had a patient who wasn't English ... English wasn't their first language and the child ended up withholding the information from her. [PS]

Students seldom expressed explicit agreement in relation to information. Of the six instances of information agreement noted, all simply expressed affirmation,

rather than discussing whether information was true, important, useful, or relevant and any reasons backing up such judgements. For example, when SW asked whose role it was to inform patients that their illness may be terminal, OT responded that it was the doctor's role. The nursing student then expressed agreement.

Sense-Making

There were 34 coded instances of sense-making sharing in T1 and 36 instances in T2. The majority of these concerned constructing understanding, with only six coded instances of students disrupting shared understanding. For T1 there were nine instances of sense-making agreeing whilst for T2 there were 15 coded instances. As with the information-accumulating mechanisms, there were no coded instances of the students discussing recording their shared or agreed understanding of the case, except for one possible exception related to noting the patient's wishes, as described below.

For constructive sense-making, students volunteered their understanding of the case, which frequently reflected the focus of their profession:

We're trying to make them have the best sort of, quality of life they can ... Pressure care is also something I'd like to consider because she has been bedbound for around two weeks. [OT]

The generative nature of sense-making, where a topic is brought up and then explored in a back-and-forth dialogue between the students as the shared understanding develops, was evident throughout the sessions. An example that occurred in both teams was a discussion about pain management that covered issues such as the appropriateness of heavy medication, mental wellbeing, and patient independence:

I was obviously thinking about this through a psychology lens and what that can do around pain management and also she said she had some drops in confidence and things like that. [PS]

You wanna reduce the number of investigations you're doing. Like, you don't be taking blood from them all the time and putting them through all that, sorta, extra pain. [M]

Although disruptive sense-making, where students challenged the existing understanding of the group, was not frequently noted, its value was highlighted by the following example, which arose at the tail end of a discussion where the team had been assuming that the patient would resist being discharged:

I just made the assumption, well, of course, she wants to go home! Why would anyone want to stay in hospital! But it's interesting I think, for you guys, perhaps making the assumption that she would want to stay. [SW]

As with information-accumulating, sense-making agreement was frequently expressed through simple indications of affirmation, such as nods or verbal utterances. Some statements, however, expressed agreement more explicitly:

I definitely agreed that the anxiety would be, is having an impact on where she is at at the moment. [PT]

I think we'll all agree that we're trying to make them have the best sort of, quality of life they can. [OT]

Statements explicitly exploring the reasons for agreement, or any nuances around the agreement, were infrequent. An example of providing a reason for agreement, albeit brief, occurred when a student pointed out that the patient might benefit from being at home and resuming her mother's care:

That's a really good point and I think especially I've been seeing a lot of people, especially with COVID, people are discharging a lot more frequently, because ... they will do better at home with their family and so, yeah, that's a really good point. [M]

Although no discussion was noted concerning directly recording understandings about the case, an indirect example occurred in relation to the patient's end-of-life decisions. Team members discussed advanced care directives although fell short of discussing how and where these may be recorded.

Decision-Making

For decision-making mechanisms, sharing was noted a total of 92 times, consisting of 55 in T1 and 37 in T2. The majority of this sharing involved outlining what options were considered appropriate, which occurred in 60 instances (45 in T1 and 15 in T2). The remainder of the sharing involved discussing general considerations about options. Agreeing about decisions was noted on 40 occasions (26 in T1 and 14 in T2), although only six of these concerned choosing between options with the remaining 34 being a simple expression of agreement with a proposed option. Recording of options was noted on nine occasions, all in T2, although six of these simply referred to recording an option in the plan.

Sharing in relation to decision-making involved general discussions concerning what types of options may be appropriate and the reasons for paths of action:

She's at a stage in her illness where really the pharmacist and doctors would take leadership roles in those decisions and nursing staff of course administer medications and patient education and all the rest of it, but I think we have at this stage in her life a greater role in organizing and implementing some social structures to help her in her family. [N]

Suggesting treatment or care options was a key element of decision-making sharing, which typically took the form of students informing the team about an item in their plan, often with some justification expressed:

I thought a short stint in rehab and that's also a nice chance for everyone to get everything that they need organized for her discharge organized." [PT]

We can also consider talking to her husband, because her husband might also help her with her activities of daily living. [PH]

As part of the process on agreeing about decisions, an example of choosing between options occurred in relation to the appropriate level of medication:

Do we want her completely pain free, but then understand that she probably will be so out of it she won't be able to look after herself independently, or are we happy to accept the threshold of pain but in turn, she would be actually able to cook for herself and probably be a bit more alert. I think that's a really hard discussion that we have with families a lot of the time. [M]

Most of the coded instances of recording simply involved students mentioning that they had recorded a task on their plans. One comment explicitly mentioned the need to record a decision, in this case a patient's decision, although failed to expand on the reasons why recording was necessary:

It would be against medical advice, and we have to note that down very clearly that this person has left against health advice. [OT]

An example of a comment regarding recording occurred in relation to the role of an advanced care plan, albeit to downplay the role of recording:

Even going into a formal way of doing it with an advanced care plan because I find the advanced care plan not ... it just doesn't have to be a document; it's about having a discussion with the family and with her about just goals for her life. [M]

Comparison of the Mechanism Categories

Table 1 displays the number of coded statements across both sessions for each of the group reasoning mechanism categories.

Table 1. Group reasoning mechanisms coded in the two Zoom sessions

	Sharing	Agreeing	Recording	Total
Information-accumulating	68 (28 related to information seeking)	6	0	74
Sense-making	70 (5 related to disrupting understanding)	24	0	94
Decision-making	92 (60 related to raising treatment or care options)	40 (6 related to choosing between options)	9 (all simply mentions of an option being recorded in the plan)	141
Total	230	70	9	309

Sharing mechanisms accounted for 74% of all coded instances (230 out of 309), occurring much more frequently than agreeing (70/309 or 23%) or recording (9/309 or 3%) mechanisms. Students appeared to be more skillful in sharing information,

understandings, and options than with discussing agreement or recording. Although a significant amount of agreement was expressed in relation to sense-making and decision-making, most of this consisted of simple expressions of affirmation rather than considered and detailed responses to peers.

Table 1 also indicates that statements were weighted more towards the decision-making mechanisms, making up almost half (141/309 or 46%) of the coded instances. Information-accumulating made up 24% (74/309) of the coded statements, whilst sense-making made up 30% (94/309). Under the format of this educational task, the same information about the case was presented to each student. This approach limits the potential for sharing information, as students have a similar vantage point on the case, thus reducing the need for sense-making agreement mechanisms. Additionally, when the focus of the task is on the production of a plan, students may assume that the expectation is to discuss plan elements rather than delving into the information and the understanding of the case that underpins the raising of, and choosing between, options.

Transitions and Resolution

Transitions between the mechanisms of information-accumulating, sense-making, and decision-making provide a means of exploring the nature of interprofessional reasoning. For example, identifying whether the group clearly agrees on understanding an aspect of the case before sharing options to address that aspect, and how the discussion on that aspect relates to understanding and option raising about other aspects of the case, provides a rich source of information, which may help to understand decision-making effectiveness in students.

Sharing mechanisms dominated the interprofessional reasoning, with agreeing mechanisms frequently being simple affirmations rather than deeper discussions and recording mechanisms being scarce. Hence, mainly the transitions between sharing mechanisms in the three categories were available for consideration. Information-accumulating mechanisms were limited as all students had access to the same case information; transitions between understanding the case and proposing options for care were a focus. Linking goals to options was an example, with some students being explicit about goals as a justification for raising options:

The goals that I sort of set are some short term rehab goals to work towards are things such as being able to ambulate with appropriate gait aid depending on what she's doing ... providing a nice strength program for her that's also full of lots of functional tasks. [PT]

In both cases, the end of the reasoning episode occurred abruptly with no explicit agreement or acknowledgement that the discussion was exhausted.

Discussion and Recommendations for Practice

The deductive analysis of interprofessional student dialogue has extended our understanding of the reasoning skills and behaviors that are enacted in an online learning module.

Decision-Making rather than Simply Opinion Sharing

Throughout both sessions students freely and actively shared their options for the treatment and care of the patient. This mainly involved raising options but also included elaborating on, explaining, and justifying them on many occasions. However, options were generally not raised in the context of considering alternatives but instead were typically presented in isolation or as a supplement to options already being discussed. Whilst students did, at times, discuss choosing between options, particularly in relation to pain medication and home return, this occurred infrequently, and the resulting discussion was time limited and lacked depth of reasoning. Explicit agreement about options occurred infrequently and lacked detail, with most agreement consisting simply of expressions of affirmation.

An interprofessional approach to group decision-making aspires to improve the decision-making process from a single professional lens to collaborative alternatives [8]. In the absence of consideration of alternative options, better decisions may not be achieved by the group. Interprofessional reasoning could be enhanced by highlighting points of disagreement, encouraging students to select from a series of proposed options and questioning justifications [11]. Methods may be developed for guiding students in how to state their own opinions openly, respectfully, and clearly regarding options that other students have raised. A starting point may be to ensure that students are aware that this is an expectation of the educational task. Prompts may be provided to enhance the analytical thinking of students. For example, students may be prompted to question whether an option is feasible, practical, efficacious, and acceptable to the patient and his or her supports. Students may also be assisted with identifying and developing effective ways of critically appraising the information contributed by their peers.

Choosing between options is an important aspect of clinical practice. There will often be resource limitations in clinical practice, as practitioners cannot carry out every feasible option for every patient. Importantly there may be a range of acceptable decisions for any given patient and family that will change over time with the progression of a patient's clinical situation and in the context of shifting psychosocial factors. Just as individual decision-making should be agile and conditional, so too should group decision-making. Furthermore, some combinations of options will be incompatible. Therefore, the team must deliberate on the relative merits of different options. Choosing what to do also entails choosing what not to do, thus excluded actions should be explicitly identified. Students would be more likely to deliberate about options if they were explicitly tasked to choose between options, rather than simply raising and justifying options. This may be achieved by limiting the overall number of items on the plan, either as a whole or for each student. A template where students list options with the reasons for adopting those options, noting exclusions and interactions, would assist with structuring the deliberation. In addition to identifying options, students need to prioritize and, if possible, sequence the selected options. There was little evidence of prioritization noted in the training exercises.

Some prioritization may be obvious, such as taking life-saving medication or dressing wounds taking priority over rehabilitative exercises, but the relative priority of other options may not be as clear, thus requiring discussion and negotiation. Practitioners cannot fully understand the professional work of all the other professions involved, and prioritization depends on other unknown factors but almost certainly requires trust in the expertise, knowledge, skill, and beneficence of other health professional team members. By requiring students to work together, using a framework to prioritize options, agree on the prioritization, and justify the reasons for prioritization, is a solid basis on which to improve reasoning in student teams.

Interprofessional reasoning relies, by definition, on the presentation and consideration of reasons [6]. Whilst students provided reasons when they simply presented individual options to the team, further consideration was lacking. Active facilitator presence with targeted prompt questions may be essential for the development of student interprofessional group reasoning [12].

Exposing Agreement

Agreement consisted of simple affirmations rather than any substantial deliberation between team members. As well as affirmatory gestures and statements, agreement deliberation would ideally involve students discussing reasoned arguments in relation to their agreement or disagreement with items that have been verbalized by their peers, such as the relevance or importance of information, ways to understand the case, or the likely consequences of suggested options.

In relation to information-accumulating mechanisms, students should be encouraged to be explicit about whether they agree that information raised satisfies certain criteria, such as truth, reliability, relevance, usefulness, and use-value, and their reasons for agreement or otherwise. Agreement need not necessarily be a binary decision. For example, staged levels of agreement may be appropriate, such as agreement contingent on further confirmation, tentative agreement, partial agreement, or possible agreement. This may also assist with exposing gaps in the information required to successfully work the case.

For sense-making mechanisms, the team activity revealed how students prioritized the case from the perspective of their relative professions. Pharmacists, for example, focused on pain management, social workers on family connections, and occupational therapists on the home environment. To produce a coordinated plan, practitioners need to agree on which areas or issues are most important to the patient's best outcome, the interrelationships between the different aspects, and which aspects are most amenable to intervention—again, being clear about the reasons why. Clinicians may also need to recognize that the skill of another clinician has primacy for a particular patient and their own role may be less relevant. This is particularly challenging for an evolving health professional student but recognizing this at a formative phase of development may be key to better quality and less expensive collaborative healthcare.

Regarding decision-making mechanisms, the previous section describes considerations regarding choosing between alternative options. Students could, as a team,

agree on the reasons why certain options have been contributed and why some of those are chosen over others. Making agreement explicit will help students develop sophisticated and effective decision-making skills. Even if no alternatives to an option are considered, explicit agreement is still valuable, particularly to detail the reasons for alternatives not being considered. Furthermore, agreement should occur about finer details of the plan, such as who is responsible for individual actions, how communication will occur between coordinating practitioners, and how progress will be reported to the interprofessional team.

To summarize, training for interprofessional team reasoning ideally involves developing skills flowing from exposing agreement between students, particularly concerning shared information, understanding the situation, and treatment and care options. This not only involves being explicit about the level of agreement, but also the reasons for agreeing or disagreeing. Exposing agreement is central to interprofessional teamwork [11]. In the absence of students deliberating together on the reasons for agreement or disagreement, even if highly coordinated, they are arguably working simply in parallel.

Identifying Information that may Disrupt Understanding

Developing an understanding of the case is a constructive exercise, as team members each contribute their viewpoints to the group. This was clearly noticeable where team members took it in turns to provide their input. Through this, each contribution typically corresponded to their professional domains. But understanding the case also depends on contributions that disrupt the existing understanding, each disruption prompting a staged raising of the understanding to a new level. This was illustrated in the example of one student disrupting the team's shared understanding that the patient wanted to remain in hospital, by informing her peers that her experience of patients was frequently the opposite. The possibility that the patient may want to return home opened the discussion to further considerations about the physical and social home environment.

Many opportunities for the disruption of understanding may arise through the interrelatedness of professions as well as through their differences. Professions that are more closely aligned, such as occupational therapists and physiotherapists, are potentially more likely to notice subtle profession-specific signs that may challenge their peers' understandings. Professions more distantly aligned, such as occupational therapists and pharmacists, may be able to offer each other perspectives on the case that would not have otherwise occurred, thus potentially challenging the existing shared understanding. With respect to prioritizing and sequencing options noted in the section above, the outcome of one professional's work will frequently be the input to others' work, thus practitioners will be able to suggest, to those that follow, different potential outcomes that may arise from their work and alter the existing understanding.

Students may be trained in techniques for identifying situations that may potentially disrupt existing understandings into the future. Rather than simply accepting that an understanding is true, students should look for information that might con-

tradict that understanding. One way to facilitate this may be to create a list of potentially understanding-disrupting items of information to be vigilant for when working with the patient in the future. For example, a list of signs of possible adverse reactions to the current course of medication could be developed, so that the practitioners who are not pharmacologically experienced but who are in regular contact with the patient may assist with monitoring whether the existing pharmacological understanding of the case is still appropriate.

Documenting the Reasoning

Recording decisions was the least addressed category, although it is recognized that the online educational format may have disturbed typical pen-and-paper documentation processes. Recording practices can enhance reasoning. If a scribe is tasked with recording the team's agreed understanding and the reasons for agreement, for example, an imperative is introduced for the scribe to be clear about these factors. The scribe may then be prompted to engage in clarification questioning, which can enhance discussion through effects that flow from making the agreement more explicit. These include alerting the team that some members do not fully agree with all the details, that some aspect such as a contextual factor has been overlooked, or that the reasons are not sufficiently convincing to all team members. Recording practices can also ensure that relevant information is not inadvertently overlooked.

In relation to information-accumulating mechanisms, students freely contributed information but failed to identify which information should be recorded, either on the plan or elsewhere. Relying on memory to retrieve information when required in the future is not an effective strategy, not only as memories can be unreliable or simply forgotten, but also because other stakeholders who did not attend the meeting may require such information. Shared tools have been proposed as a useful mechanism to facilitate team reasoning [8]. A shared documentation template may therefore be a useful artefact to include in future education activities.

Similarly, with sense-making mechanisms, the shared plan should document a problem list that identifies the problems in order of priority, relationships between problems, and reasons for prioritizing certain problems. Again, such documentation will facilitate interprofessional reasoning, as practitioners would be required to agree on why some problems are relatively more or less important than others. A further benefit may be in prompting the team to involve the patient in shared decision-making, as importance is often a value-based judgement, and often the patient is the arbiter of this. Also, problems are less likely to be inadvertently overlooked if an explicit focus is placed on recording them. Furthermore, decisions will be enhanced through the relationship between the problem list, the developed goals, and the options raised for addressing those goals.

The agreement of tasks and actions is arguably the main goal of team meetings. The framework suggests that information-accumulating and sense-making mechanisms may be considered as inputs to the decision-making mechanisms. Along with recording details of the information considered by the team and the resulting team understanding, as discussed above, the details of options considered as well as

those excluded, along with the reasons for adopting or not adopting particular options, should be recorded. Although recording has been discussed above separately in relation to the three mechanism areas, the interconnectedness of mechanism areas suggests that improved recording in one mechanism area will improve the reasoning in others. For example, through the process of recording an agreed understanding, a realization may arise that further information is required. In summary, training should include a focus on recording relevant aspects of the team's reasoning across all three mechanism areas, not just a list of tasks making up the plan, and appropriate documentation tools should be developed to guide students.

Future Research

Educational models provide one mechanism to understand practice although theories are expected to continually grow and develop. Social systems are heavily context dependent. In interprofessional reasoning, a multitude of significant differences exist in the types of cases, the professions participating, the personalities of the individual team members, and the clinical policies and practices. These factors suggest that the theoretical understanding of interprofessional reasoning should continue to develop through exploring a range of different contexts. Varied combinations of team members may also be studied, not only variation in the practitioners, but also differences in patients and the relationships between practitioners and patients. Cultural differences are also influential. For example, some cultures, such as hierarchy oriented medical domains, may focus less on team reasoning [13]. Such explorations may result in the construction of domain-specific interprofessional reasoning models, in different ways of operationalizing an overarching model, or in integrating interprofessional reasoning models with other theories.

Within the group reasoning framework as it currently stands [9], further work on exploring the transitions between reasoning mechanisms is warranted, such as from understanding the case to raising options to deciding between options. Once students are aware of the full range of reasoning mechanisms and are applying them in simulated team meetings, transcripts may be coded to determine the nature of their transitions and hence to identify associated ways to improve interprofessional reasoning. Many important questions may be explored through this approach, such as: Do students have sufficient information shared between them to support a strong understanding of the case? Are students sufficiently clear about their level of agreement about the most important features of the case to support raising options for the plan? Are students moving to appropriate information gathering techniques when they discover problems with their understanding of the case or with the selection of options? Various practical improvements may result from these explorations. For example, prompts could be constructed for determining whether they have sufficient information to move on to subsequent reasoning phases, or checklists developed for determining whether a threshold of agreement has been achieved between team members during different phases.

Limitations

This initial study was conducted on two volunteer groups of students. Examination

of the reasoning processes within other interprofessional student cohorts is required. Unlike clinical practice, the patient's discharge preference was not shared explicitly with the student team. Finally, the nature of the task given to the student groups did not explicitly ask for a "decision" regarding discharge to be made; a final decision was difficult where it was deemed additional information may be required.

Conclusions

This research applied a framework of group reasoning to interprofessional reasoning occurring during an online palliative care education module. Whilst the mechanisms were originally described in the context of acute care hospital ward rounds, they were found to be useful in exploring the reasoning skills of students.

The framework supported answers to the research question of explaining how students enact interprofessional reasoning. Findings included that students freely shared information, their understanding of the situation, and their ideas for items on the discharge plan. Whilst students displayed signs that they agreed with the contributions of their colleagues, the agreement was shallow, and work needs to occur to enhance the group confidence and processes of agreement. Recording is an important element of group reasoning, for which little evidence was found. The use of group reasoning mechanisms to improve training for students provided a range of suggestions. It allowed for improvement areas to be identified, particularly in relation to increasing the focus on decision-making about options, exposing agreement about all aspects of the reasoning, identifying potential disruptions to the agreed understanding, and increasing the focus on documentation whilst reasoning interprofessionally. Further, this study provides a starting point from which to improve future theorizing about interprofessional reasoning. This includes a closer examination of the dynamic aspects of reasoning, such as transitions between mechanisms, the development of context-specific models of interprofessional reasoning, and the creation of theories about interprofessional reasoning based on group reasoning mechanisms and models.

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