**3.1 Sample characteristics**

A total of 199 messages were collected and reviewed for analysis. Most messages (n=97; 49%) were authored by patients, while a total of 60 messages (30%) were from clinicians, such as physicians and nurse practitioners. The remaining messages (n=42; 21%) were system-generated automated messages, which were mostly appointment reminders.

* 1. **Code Co-Occurences**

**Prevelance of PCC Categories**

The highest coefficient was 0.77 among messages sent by patients within the information-seeking category, indicating a strong relationship. A somewhat strong relationship was also present between automated messages and information-giving. The highest coefficient among clinician messages was associated with the information-giving category (0.31), followed by emotional support (0.23), but neither suggest a strong relationship.

Out of the 508 codes assigned to messages, the majority ofcodes (68%, n=346) were designated as information-giving. Every message sent from the automated system consisted of information-giving, making up 39% (n=136) of the codes in the category. Information-giving was the most frequent code applied to patient messages, comprising 33% (n=113) of information-giving codes, and 28% (n=97) of information-giving codes were included by clinicians. Patient messages were coded in every category, with information-seeking the second most coded (n=78) following information-giving. Third was emotional support (n=31), partnership (n=15), and shared decision-making (n=2). Information-seeking was primarily used by patients compared to clinicians, but among clinicians, emotional support was the second most frequently coded category (n=21), followed by partnership (n=8). Table 3 has a summary of frequencies among categories and coefficients.

Table 3. C-Coefficient Results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Automated Messages (n=42) | | Clinician Messages (n=60) | | Patient Messages (n=97) | |
|  | *Count* | *Coefficient* | *Count* | *Coefficient* | *Count* | *Coefficient* |
| Emotional Support (n=52) | 0 | 0.00 | 21 | 0.23 | 31 | 0.26 |
| Information-Giving (n=346) | 136 | 0.54 | 97 | 0.31 | 113 | 0.34 |
| Information-Seeking (n=82) | 0 | 0.00 | 4 | 0.03 | 78 | 0.77 |
| Partnership (n=23) | 0 | 0.00 | 8 | 0.11 | 15 | 0.14 |
| Shared Decision-Making (n=5) | 0 | 0.00 | 3 | 0.05 | 2 | 0.02 |

Quotes from messages should be excluded exactly as they were written, with minor edits made to improve readability. Only the phrase indicative of the communication code/category should be extracted to reduce noise.

***1. Information-Giving***

The content of information-giving within automated messages mostly comprised of instructions for patients before their consultation. For instance, messages included reminders about appointment times, the location of the appointment, and prompts to download the patient portal application onto mobile devices. Patients provided information to clinicians by reminding them about upcoming procedures that were not yet scheduled and the outcomes of recent test results. For instance, a patient wrote, “*I had my blood testing done yesterday at [location], results associated with the liver were elevated. Just want to be sure you or your staff received my results.*” Patients also updated clinicians about their interactions with other clinicians to ensure that all members of their care team were properly informed. This occurred in the following example: *“Dr. [name] has called to let me know I’m not eligible for the immunotherapy clinical trial at this time. He thinks I might be eligible for a different trial this fall….”* Clinicians offered information mainly in the form of advice and alerting patients about administrative issues. It was common for clinicians to write, *“I will put in the lab orders,” “I just sent the script request,”* and *“The results are not back yet.”* In response to patients’ providing information received during other visits, clinicians often replied by attempting to make clarifications and offering their perspective. For example, a clinician wrote, *“I think you must mean [drug name]. If they need you to stop prior to the test, that’s OK because it is a blood thinner, and they may need you to be off of it for the test.”*

Clinicians expressed information-giving with statements beginning with “I,” such as “*I will prescribe you*,” and variations of “*I will ask the doctor*” and “*I will give this to the doctor.*” Patients described medical problems they were experiencing, such as the presence of blood in their urine and stool. Secure messaging was also used by patients to verify the information in their medical records. SM included statements notifying clinicians that certain medications or injections were missing. They also made clinicians aware of potential errors to avoid issues with their insurance company. For example, a patient wrote, “*I just noticed that my upcoming CT scan on [date] does not include the chest. Want to be sure proper insurance approvals are in place.*”

***2. Information-Seeking***

Information-seeking mostly comprised of patients asking clinicians about various issues, such as medication refills, appointment schedules, health concerns, medical tests, and insurance/billing. When seeking information pertaining to concerns about health or a specific test result, patients tended to describe the context in which they were seeking the information. For example, a patient wrote:

*I just was told my daughter will be getting treated for [disease] tonight and has to stay out of school for 24 hours. I am supposed to have her this weekend and wanted to check to see if there are any issues I should be concerned about this weekend or if I should not take her this weekend since I might have a weakened immune system. If there is nothing to worry about, please let me know so I can set my ex-wife’s mind at ease about this weekend.*

Clinician messages about information-seeking were about test scheduling. Queries about test results and schedules were made in the context of coordinating care with other clinicians the patients were seeing. For example, a clinician messaged their patient about getting certain tests done to facilitate the patient’s upcoming meeting with another clinician by writing, “*Were you able to get these done? She will need to see the labs before you start the medication*.”

***3. Emotional Support***

Emotional support was indicated by patients’ cues, allowing clinicians to respond with expressions of emotional support. Patient cues comprised of statements or questions that included concern, uncertainty, or fear. For instance, a patient expressed fear by writing, *“the wait is driving me nuts.”* Patients also expressed emotion in the form of gratitude when they had received assistance from clinicians in getting a procedure done or receiving a timely prescription. For instance, a patient thanked their clinicians by saying, *“you will never know how grateful I am to you and your entire team. Thanks for EVERYTHING.”* Patients were also mindful of clinicians’ time. A patient wrote to their clinician after asking for a revised letter, “*I am really sorry for the trouble.*”

Clinician messages were coded for emotional support when the clinician actually expressed emotional support for the patient, mainly in the form of providing reassurance and comfort. For instance, a clinician provided information about the effectiveness of a certain medication by beginning their statement with, *“Hi, am hoping [you] may find below reassuring*..*.”* Another way clinicians expressed emotions was to validate patients’ expressions of emotions by empathizing with them. For example, a clinician said, “*I understand your concern*” when letting the patient know about the unavailability of an appointment. Clinicians also apologized when writing a delayed response to a patient’s query.

***4. Partnership***

Partnership was expressed by creating opportunities for patients to equally participate in their care. Clinicians did so by providing medical information to patients and by encouraging them to ask questions. For example, a clinician encouraged a patient to keep reaching out to them by writing, *“Please do bother us directly … You couldn’t bother us if you tried:).”* Partnership from clinicians also transpired in the form of checking patients’ understanding regarding medications or medical procedures. For example, a clinician first clarified whether they were talking about the right medication before explaining its effects and dosage to the patient, “*I think you must mean [medication].”* Patients expressed partnership by being engaged and active in the interaction. They reminded clinicians about things that may have lapsed, followed up about the next steps that doctors mentioned, and alerted clinicians when labs were elevated. Patients used first-person plural pronouns (i.e., “we”), expressing an equal status, such as, *“I am writing to see how we should proceed.”*

***5 Shared Decision-Making***

In rare instances of shared decision-making, patients initiated it by offering opinions about their treatment. For example, a patient wrote, “*Can we possibly worry about the colonoscopy once these other potential issues are resolved?*” Clinicians expressed shared-decision making by being receptive to patient suggestions, stating their recommendations, but also asking for the patient’s opinion.