

# Voting with Their Thumbs: Assessing Communication Technology Use by Medical, Nursing, Midwifery, and Allied Health Clinicians

Doug Lynch<sup>1</sup> Rebecca M. Jedwab<sup>2,3</sup> Joanne Foster<sup>2,4</sup> Yannick Planche<sup>1</sup> Lucy Whitelaw<sup>5</sup> Junyi Shi<sup>6</sup>  
Ashray Rajagopalan<sup>7,8</sup> Michael Franco<sup>8,9</sup>

<sup>1</sup> Department of Medical Informatics, Monash Health, Melbourne, Victoria, Australia

<sup>2</sup> Department of Nursing and Midwifery Informatics, Monash Health, Melbourne, Victoria, Australia

<sup>3</sup> School of Nursing and Midwifery, Centre for Quality and Patient Safety Research, Institute for Health Transformation, Deakin University, Melbourne, Victoria, Australia

<sup>4</sup> Victorian Branch Committee Member, Australian College of Critical Care Nurses, Melbourne, Victoria, Australia

<sup>5</sup> Department of Allied Health Workforce, Innovation, Strategy, Education and Research (WISER) Unit, Monash Health, Melbourne, Victoria, Australia

<sup>6</sup> Department of Medical Services, Goulburn Valley Health Shepparton, Shepparton, Victoria, Australia

<sup>7</sup> Department of Medical Services, Monash Health, Melbourne, Victoria, Australia

<sup>8</sup> Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, Victoria, Australia

<sup>9</sup> Department of EMR and Informatics, Monash Health, Melbourne, Victoria, Australia

**Address for correspondence** Rebecca M. Jedwab, CCRN, BSc, MNP, MNursPrac, FACN, Department of Nursing and Midwifery Informatics, Monash Health, 246 Clayton Road, Clayton, Melbourne, Victoria 3168, Australia (e-mail: rebecca.jedwab@monashhealth.org).

Appl Clin Inform 2022;13:916–927.

## Abstract

**Background** Timely multidisciplinary communication is crucial to prevent patient harm related to miscommunication of clinical information. Many health care organizations provide secure communications systems; however, clinicians often use unapproved platforms on personal devices to communicate asynchronously.

**Objective** The aim of the study is to assess clinical communication behaviors by clinicians in a hospital setting.

**Methods** Medical, nursing and allied health staff working across seven hospital sites of a large health care organization were invited to complete an anonymous survey on the methods, behaviors, and rationale for clinical communication technology use. The survey included questions on communication methods used by clinicians for intra- and inter-disciplinary communication and sending and receiving clinical information or images. Demographics and qualitative comments were also collected.

**Results** A total of 836 surveys were completed (299 medical, 317 nursing, and 220 allied health staff). Staff in all clinical groups reported using an unapproved messaging platform to communicate patient information more than three times per day (medical staff  $n = 167$ , 55.9%; nursing staff  $n = 106$ , 33.4%; allied health staff  $n = 67$ , 30.5%). Not

## Keywords

- ▶ communication
- ▶ electronic medical record
- ▶ workflows
- ▶ quality

received  
April 28, 2022  
accepted after revision  
August 16, 2022

© 2022. Thieme. All rights reserved.  
Georg Thieme Verlag KG,  
Rüdigerstraße 14,  
70469 Stuttgart, Germany

DOI <https://doi.org/10.1055/s-0042-1757158>.  
ISSN 1869-0327.

one medical staff member indicated they only use the approved methods ( $n = 0$ , 0%) while one-third of nursing and allied health respondents only used approved methods ( $n = 118$ , 37.2% and  $n = 64$ , 29.1%, respectively). All clinician groups reported wasted time from communications sent with missing information, or time spent waiting for responses for further information. Qualitative comments expressed dissatisfaction and frustration with current clinical communication methods and a desire for improved systems.

**Conclusion** Workarounds are being used by all clinician groups to send text and image clinical communications. There are high levels of dissatisfaction with this situation and clinicians are keen for consistency and to have the right tools available. There is a need to ensure standardized clinical communication methods and approved digital platforms are in place and utilized to provide safe, high-quality patient care.

## Background and Significance

Effective communication in complex professional environments, such as health care, is paramount to safe and quality patient care delivery and includes the systems and processes required to support it.<sup>1,2</sup> Older communication devices such as pagers have long been provided by health care organizations. In recent years, the use of smartphone-based communications systems has exploded. This has provided multiple user-friendly but unregulated alternatives to pagers. The use of personal devices for clinical communication within the health care setting is problematic, especially it is a potential risk to patient's confidentiality and data security.<sup>3</sup> Use of personal devices by clinicians for clinical communication has been assumed throughout health care due to their ease of use and workarounds surrounding dissatisfaction with older technology.<sup>4</sup> The multiple implications of using personal or unsupported devices or platforms by the health care organization have security, patient privacy, and legal implications.<sup>4</sup> Perhaps due to the potentially sensitive nature of this topic, there is a gap in the literature examining multidisciplinary clinicians' use and frequency of non-approved clinical communication methods.<sup>3</sup>

The multidisciplinary nature of care delivery in Australia required a multidisciplinary examination of clinical communication practices throughout the health care organization. Differences in workflows and clinical locations between clinician groups, as well as some clinicians having pagers as part of their roles have implications for understanding the diverse needs and clinical communication methods used by different staff throughout the health care organization.

### Significance

Assessing clinical communication methods will provide up-to-date insight into the number, extent, concerns, and workarounds of clinicians using alternative platforms to communicate clinical information. There is a need to understand what clinicians require and desire from communication platforms to perform their roles. The results of this study are expected to assist in clinician communication and workforce planning, while ensuring ongoing compliance, patient safety, and quality care delivery.

### Objective

The aim of the study is to assess clinician communication behaviors in the hospital setting and uncover workforce preferences.

### Methods

A cross-sectional descriptive survey was developed by the Clinical Informatics team to examine clinicians' methods, behaviors, and rationale for communication technology use. The survey investigated communication methods used and frequency for intra- and inter-disciplinary communication, methods of sending and receiving clinical information and images, time spent gathering further information when paged/paging, time spent using switchboard, how often people received communications not intended for them, and use of patient identifiers in communications.

Where possible, the exact same questions were used for each of the three largest professional groups to facilitate interdisciplinary comparison. The multidisciplinary clinical informatics research team designed questions specifically to capture the most common workflows. For example, several workflows were included only for non-pager carrying nursing staff (related to paging other clinicians and time for a response) and one question (regarding patient information when sending clinical images) was included for only medical and allied health staff.

Demographic questions about their role classification and rostering were included, as well as a space for free-text comments with the prompt "Do you have further comments regarding clinical communication within the health care organization?" to capture any other comments by clinicians.

### Data Collection and Analysis

Data collection occurred in three stages between late 2020 and mid-2021 to minimize the burden on clinical staff: first, medical staff were recruited, second nursing staff and third allied health staff were recruited. Convenience sampling of clinicians occurred using recruitment via emails to staff, including team leaders and managers. Data was collected

and stored anonymously via a secure password-protected platform.

Frequencies and descriptives of the survey data were examined using IBM SPSS Statistics (Version 27) for Windows and free-text comments were analyzed using content analysis.<sup>5</sup>

### Setting

A large Australian quaternary health care organization was the setting of this study. This health care organization has over 20,000 employees, approximately 3,300 beds, and serves the largest geographic area of any health care organization in the state of Victoria. Comprehensive health care is delivered for patients from birth to end-of-life, including inpatient, outpatient, and community settings.

### Inclusion and Exclusion Criteria

Medical, nursing, and allied health staff working across seven hospitals of the health care organization in all settings where pagers were commonly in use were eligible to participate. Staff working in aged-care settings were excluded due to anticipated differences in workflows and communication methods and frequencies.

### Ethics Approval

Ethics approval was granted by the health care organization (reference number RES-21-0000-355Q-76239).

## Results

A total of 836 surveys were completed by 299 medical staff, 317 nursing staff, and 220 allied health staff. This represents just under a 20% response rate for Medical and Allied Health staff at our organization. We had a similar response rate from pager carrying nursing and midwifery professionals. Participants' demographics information is presented in **Table 1**.

### Clinical Communication Platforms

More than half of medical staff and a third of both nursing allied health staff used an unapproved messaging platform other than the provided paging service to communicate clinical information about patients with other clinicians more than three times per day (medical staff  $n=167$ , 55.9%; nursing staff  $n=106$ , 33.4%; allied health staff  $n=67$ , 30.5%).

Notably not one medical staff indicated they only use the approved methods of paging or phone calls ( $n=0$ , 0%) while approximately one-third of nursing and allied health respondents only used approved methods ( $n=118$ , 37.2% and  $n=64$ , 29.1%, respectively).

Text (SMS) message was the most frequently used platform by medical staff ( $n=225$ , 75.3%), followed by WhatsApp ( $n=198$ , 66.2%), Webex ( $n=66$ , 22.1%), and Facebook Messenger ( $n=4$ , 1.3%).

**Table 2** presents the frequency of clinicians using a messaging platform (apart from paging) to communicate patient clinical information and **Table 3** details the platforms used for clinical communication (multiselect).

### Time Wasted Waiting for Information or Communication

When receiving a page, nearly half of the doctors stated they needed to seek further information from the sender to appropriately triage and respond three times per day or more ( $n=120$ , 40.1%). Although allied health staff also needed to seek further information from the sender to appropriately triage and respond, the highest percentage of staff needed to do this a little less often at one to two times per day ( $n=41$ , 18.6%). Nursing staff performed this task even less often, with highest percentage of staff seeking further information around once per week ( $n=28$ , 8.8%).

When waiting for a response to request for further information, all three professional groups reported most common wait times of between 5 and 15 minutes (medical  $n=77$ , 25.8%; nursing  $n=71$ , 22.4%; allied health  $n=53$ , 24.1%). 15.4% of medical staff ( $n=46$ ) received pages intended for another recipient one to two times per day.

Medical and allied health staff commonly never received pages with all necessary information to identify the sender, patient information, and contact details ( $n=54$ , 24.5% and  $n=87$ , 29.1%, respectively). Though nurses were less frequently the recipients, nurses only received pages with the necessary information up to 25% of the time ( $n=52$ , 16.4%).

Across the three clinician groups, time spent waiting for the hospital contact center/switchboard to connect a clinician with the appropriate person was all less than 5 minutes (usually one to two attempts) (medical staff  $n=148$ , 49.5%; nursing staff  $n=136$ , 42.9%; allied health staff  $n=108$ , 49.1%).

**Tables 4 to 8** detail the following points:

1. Frequency of recipient of a page needing to seek further information to triage.
2. Time taken for the sender to reply with the required information.
3. Frequency of pages intended for a different recipient.
4. Frequency of pages that include required patient information and,
5. Time taken for switchboard to put the caller in contact with the correct recipient.

### Sending and Receiving Clinical Images

Medical staff sent clinical images most often, on average once per week ( $n=63$ , 21.1%). Text message (SMS) was the preferred method to send images by all clinicians (medical  $n=185$ ; nursing  $n=41$ ; allied health  $n=21$ ). A patient's body part (e.g., to show a wound) was the most common image sent by all clinicians (medical staff  $n=199$ ; nursing staff  $n=42$ ; allied health staff  $n=20$ ). The lack of access to a secure platform to send images stopped 57.2% of medical staff ( $n=171$ ), 36% of nursing staff ( $n=114$ ) and 30.5% of allied health staff ( $n=67$ ) from sending images to other clinicians. The self-reported rates of medical and allied health staff including patient information every time when sending an image were low (medical  $n=25$ , 8.4%; allied health  $n=7$ , 3.2%), and frequencies of clinicians obtaining and documenting patient consent before sending an image was also low across all groups (medical  $n=39$ , 13%; nursing  $n=22$ , 6.9%; allied health  $n=17$ , 7.7%).

**Table 1** Participants' demographics information

			<i>n</i>	%
Medical staff	Classification	HMO	89	28.1
		Registrar	85	26.8
		Consultant	114	36.0
		Fellow	9	2.8
		Other	2	0.6
		Missing	18	5.7
	Work schedule	Limited days/times with 2 on-call	9	2.8
		Primarily weekdays with on-call after-hours and weekends	100	31.5
		Primary weekdays with 2 on-call or weekends	10	3.2
		Shift work across weekdays and weekends—day, evening, night shifts	173	54.6
		Other	7	2.2
Missing	18	5.7		
Nursing staff	Classification	Registered nurse (graduate)	10	3.2
		Registered nurse	103	32.5
		Enrolled nurse	12	3.8
		Clinical nurse specialist	26	8.2
		Associate nurse manager	39	12.3
		Nurse manager	56	17.7
		Educator	38	12.0
		Nurse consultant or nurse practitioner	15	4.7
		Director of nursing or executive	2	0.6
		Other	16	5.0
	Work schedule	Shift work across weekdays and weekends—day, evening, night shifts	153	48.3
		Primarily weekdays with on-call after-hours and weekends	16	5.0
		Primary weekdays with no on-call or weekends	133	42.0
		Limited days/times with no on-call	4	1.3
		Other	11	3.5
	Allied health staff	Classification	Art therapy	1
Allied health assistant			31	9.8
Child life therapy			5	1.6
Music therapy			4	1.3
Neurophysiology			4	1.3
Nutrition and dietetics			31	9.8
Occupational therapy			45	14.2
Physiotherapy			30	9.5
Podiatry			6	1.9
Social work			35	11.0
Speech pathology			17	5.4
Other			11	3.5
Work schedule		Primarily weekdays with no on-call or weekends	163	51.4
		Primarily weekdays with on-call after-hours and/or weekends	52	16.4
		Locum with limited days	1	0.3
		Other	4	1.3
		Missing	97	30.6

**Table 2** Frequency of messaging platform use to communicate with other clinicians about patient clinical information

	Medical		Nursing		Allied health	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
3x per day or more	167	55.9	106	33.4	67	30.5
1–2x per day	43	14.4	28	8.8	42	19.1
At least 3x per week	28	9.4	30	9.5	20	9.1
Around 1x per week	17	5.7	13	4.1	18	8.2
1x every 2 wk	3	1.0	8	2.5	1	0.5
1x every month or less	22	7.4	14	4.4	8	3.6
Never, I only use paging and/or phone calls	0	0.0	118	37.2	64	29.1
Missing	19	6.4	0	0.0	0	0.0
Total	299	100.0	317	100.0	220	100.0

**Table 3** Platforms used for clinical communication (excluding paging) (multiselect)

	Medical	Nursing	Allied health
	<i>N</i>		
Text message	225	141	104
WhatsApp	198	38	39
Facebook Messenger	4	14	10
Webex	66	111	80
Other (including phone calls and emails)	262	154	124

**Table 5** Length of time for sender to respond with requested information

	Medical		Nursing		Allied health	
	<i>n</i>	%	<i>n</i>	<i>n</i>	%	<i>n</i>
Less than 5 min	20	6.7	20	6.3	11	5.0
5–15 min	77	25.8	71	22.4	53	24.1
16–30 min	48	16.1	35	11.0	36	16.4
More than 30 min	48	16.1	44	13.9	42	19.1
N/A	90	30.1	147	46.4	78	35.5
Missing	16	5.4	0	0.0	0	0.0
Total	299	100.0	317	100.0	220	100.0

**Table 4** Frequency of pages received that require seeking further information to triage and respond

	Medical		Nursing		Allied health	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
3x per day or more	120	40.1	23	7.3	31	14.1
1–2x per day	29	9.7	24	7.6	41	18.6
At least 3x per week	21	7.0	25	7.9	37	16.8
Around 1x per week	9	3.0	28	8.8	17	7.7
1x every 2 wk	2	0.7	12	3.8	1	0.5
1x every month or less	3	1.0	15	4.7	13	5.9
Never or N/A	20	6.7	189	59.6	25	11.4
Other	79	26.4	1	0.3	55	25.0
Missing	16	5.4	0	0.0	0	0.0
Total	299	100.0	317	100.0	220	100.0

**Table 6** Frequency of receiving pages intended for another clinician

	Medical		Nursing		Allied health	
	<i>n</i>	%	<i>n</i>	<i>n</i>	%	<i>n</i>
3x per day or more	29	9.7	4	1.3	4	1.8
1–2x per day	46	15.4	5	1.6	13	5.9
At least 3x per week	39	13.0	7	2.2	17	7.7
Around 1x per week	23	7.7	0	0.0	34	15.5
1x every 2 wk	16	5.4	9	2.8	8	3.6
1x every month or less	18	6.0	36	11.4	52	23.6
Never	27	9.0	74	23.3	23	10.5
N/A	85	28.4	168	53.0	69	31.4
Missing	16	5.4	14	4.4	0	0.0
Total	299	100.0	317	100.0	220	100.0

**Table 7** Frequency of pages including all required patient information and sender details

	Medical		Nursing		Allied health	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Always (100% of the time)	0	0.0	7	2.2	1	0.5
Usually (75%)	5	1.7	31	9.8	10	4.5
Sometimes (50%)	32	10.7	29	9.1	27	12.3
Rarely (25%)	77	25.8	52	16.4	51	23.2
Never (0%)	87	29.1	46	14.5	54	24.5
N/A	82	27.4	152	47.9	77	35.0
Missing	16	5.4	0	0.0	0	0.0
Total	299	100.0	317	100.0	220	100.0

**Table 8** Length of time taken (on average) to be put in contact with the correct person through switchboard

	Medical		Nursing		Allied health	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Less than 2 min (the first try)	37	12.4	69	21.8	43	19.5
Less than 5 min (1–2 tries)	148	49.5	136	42.9	108	49.1
Less than 15 min (multiple tries)	58	19.4	44	13.9	24	10.9
More than 15 min	37	12.4	25	7.9	7	3.2
N/A	3	1.0	43	13.6	38	17.3
Missing	16	5.4	0	0.0	0	0.0
Total	299	100.0	317	100.0	220	100.0

– Tables 9 to 14 detail responses about:

1. how often clinical images are sent.
2. the frequency, type of platform used, and type of clinical images.
3. whether lack of a secure platform ever prevented clinical images being sent.

4. whether patient information was included when sending clinical images and,
5. whether patient consent was obtained.

#### **Sending Pages**

Nursing staff were questioned how often they needed to seek or clarify further information from senders of pages, how often

**Table 9** Frequency of sending a clinical image to another clinician

	Medical		Nursing		Allied health	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
3x per day or more	17	5.7	1	0.3	1	0.5
1–2x per day	45	15.1	1	0.3	6	2.7
At least 3x per week	42	14.0	8	2.5	1	0.5
Around 1x per week	63	21.1	0	0.0	9	4.1
1x every 2 wk	23	7.7	8	2.5	3	1.4
1x every month or less	55	18.4	37	11.7	25	11.4
Never	32	10.7	170	53.6	127	57.7
N/A			88	27.8	48	21.8
Missing	22	7.4	4	1.3	0	0.0
Total	299	100.0	317	100.0	220	100.0

**Table 10** Platform used to send clinical image to another clinician (multiselect)

	Medical	Nursing	Allied health
	<i>N</i>		
Text message	185	41	21
WhatsApp	142	4	12
Facebook messenger	0	2	0
Webex	11	2	1
Other (including emails, personal mobile phone, EMR)	24	19	16
N/A	31	1	6

Abbreviation: EMR, electronic medical record.

**Table 11** Types of clinical images sent (multiselect)

	Medical	Nursing	Allied health
	<i>N</i>		
Body part of a patient (e.g., a wound)	199	42	20
X-ray, CT scan, or other imaging	172	5	10
ECG, CTG, or other written report	185	10	1
Medication list or other clinical documentation	68	14	3
Other (including patient details, copies or excerpts of notes and letters, pathology, detailed information about a dressing or machine, equipment)	9	8	16
N/A	31	6	5

Abbreviations: CTG, Cardiotocography; ECG, electrocardiogram.

**Table 12** Lack of secure platform impacted clinicians sending clinical images

	Medical		Nursing		Allied health	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Yes	171	57.2	114	36.0	67	30.5
No	91	30.4	52	16.4	64	29.1
N/A	15	5.0	151	47.6	89	40.5
Missing	22	7.4	0	0.0	0	0.0
Total	299	100.0	317	100.0	220	100.0

**Table 13** Frequency of including patient information when sending images

	Medical		Allied health	
	<i>n</i>	%	<i>n</i>	<i>n</i>
Always (100% of the time)	25	8.4	7	3.2
Usually (75%)	35	11.7	10	4.5
Sometimes (50%)	48	16.1	4	1.8
Rarely (25%)	69	23.1	10	4.5
Never (0%)	71	23.7	8	3.6
N/A	29	9.7	6	2.7
Missing	22	7.4	175	79.5
Total	299	100.0	220	100.0

**Table 14** Frequency of obtaining and documenting consent when sending clinical images

	Medical		Nursing		Allied health	
	<i>n</i>	%	<i>N</i>	%	<i>n</i>	%
Always (100% of the time)	39	13.0	22	6.9	17	7.7
Usually (75%)	54	18.1	8	2.5	11	5.0
Sometimes (50%)	49	16.4	5	1.6	4	1.8
Rarely (25%)	58	19.4	11	3.5	3	1.4
Never (0%)	45	15.1	6	1.9	4	1.8
N/A	32	10.7	8	2.5	6	2.7
Missing	22	7.4	257	81.1	175	79.5
Total	299	100.0	317	100.0	220	100.0

**Table 15** Frequency of sending a page to seek more information

	Nursing	
	<i>n</i>	%
3x per day or more	17	5.4
1–2x per day	14	4.4
At least 3x per week	16	5.0
Around 1x per week	14	4.4
1x every 2 weeks	2	0.6
1x every month or less	18	5.7
Never or N/A	106	33.4
Missing	130	41.0
Total	317	100.0

patient details were included by the sender, and how long it takes for the sender to respond. Most nurses' responses were not applicable or missing (→ **Tables 15–17**).

### Qualitative Comments

Free-text comments captured clinicians' views on intra- and inter-disciplinary communication and transferring of clinical information.

**Table 16** Frequency of sending pages including all required patient information and sender details

	Nursing	
	<i>n</i>	%
Always (100% of the time)	13	4.1
Usually (75%)	14	4.4
Sometimes (50%)	17	5.4
Rarely (25%)	35	11.0
Never (0%)	39	12.3
N/A	70	22.1
Missing	129	40.7
Total	317	100.0

### Medical Staff

In total, 115 comments were left by medical staff. Generally, these were either comments that expressed clinician dissatisfaction with the existing pager system, occasionally explaining why, or suggestions for alternative communication technologies and the principle clinicians felt important for these future technologies. Many clinicians noted that “*The pager system is outdated*”, while one respondent explained



**Table 17** Time taken for response with required information

	Nursing	
	n	%
Less than 5 min	6	1.9
5–15 min	30	9.5
16–30 min	34	10.7
More than 30 min	43	13.6
N/A	74	23.3
Missing	130	41.0
Total	317	100.0

that the “Paging system is consistently unreliable. More often than not, no call-back number is sent. Even when number is provided and I call back immediately, the number is typically engaged, or not answered”.

On the other hand, one respondent from a department without pagers complained that they received “constant phone calls about non urgent things that will often interrupt a more urgent task” and concluded that “When you get upward of 50 calls per day patient care is severely affected.” They also pointed out that using phone calls in lieu of pagers meant that “there’s no record of who spoke to you, about which patient and what they were requesting.”

Interestingly, respondents had many insightful suggestions about future directions beyond using pagers and phone calls. One respondent thought that “Significant improvement in patient safety and medical staff efficiency is achieved with a system... allowing for immediate response/feedback both to clarify details and to respond when tasks are completed.” Similarly, another respondent thought it was important that “the sender is notified when the page is sent and when it is seen” and that users could “message back-and-forth.”

Another common theme for future directions was that any communication service should facilitate transfer of clinical images. One respondent “Would really advocate for secure platform especially for clinical images to be transferred to other clinicians” while another thought it important that “clinical images can be taken and delivered completely securely and are not stored on personal devices.”

Finally, many respondents complained that they often erroneously received pagers or phone calls meant for others. One clinician explained that “Switch[board] often has the incorrect person on roster for calls, I get several calls per week that need to be redirected”, they hoped that any future communication strategy would “resolve this.” It was suggested by another respondent that any communication solution should ensure messages were “sent securely, to the correct person”, that they could “be redirected if needed.”

### Nursing Staff

Free-text comments were left by 93 nursing staff. The majority of these were related to the dissatisfaction of the current paging system. Nurses described the system as outdated and unreliable. They believed the system negatively impacted nurses’ work and workflows as it has a limited

word count, there was no way to determine whether the page has been delivered: “In my experience patient care has been put at risk multiple times due to the current paging system. Often switchboard do not have the correct pager number, the team are not carrying their pager and you have no way of knowing whether your request for an urgent review has been received or responded to”; “In the current system you cannot communicate the sense of urgency...information has to be short otherwise the messaging gets cut short therefore using three identifiers is difficult. There is no acknowledgement of receiving the message therefore you are left unsure if the communication platform worked.”

The response to introducing a computerized paging system that allowed the sender to see the page was received positively, however, nurses were frustrated that it is only in use in night shifts: “We already have a great system – it’s [name of night shift paging system] and it needs to be 24/7 all clinicians.”

Nurses want different ways to communicate with other professions and want it to be efficient and easy to use: “Anything to make it easier would be greatly appreciated!”; “I would use a secure platform to communicate clinical information if there was one available”; “paging system is very difficult as you get no response, so, it is not sure if they receive the page or not, often leading to requiring to page multiple times”.

### Allied Health Staff

A total of 71 free-text comments were supplied by Allied Health staff. Similarly to nursing staff, comments were often related to dissatisfaction with existing systems. Significant times spent requesting further information from paging processes often led to frustration and workarounds, and poor access to hardware to support their work was a significant concern: “Following up on pages wastes SO much of our time. Even just trying to work out the correct pager number for the clinician we’re trying to contact is hard, and then waiting for a response just adds to that”; “Lack of computers makes responding to a page quickly difficult at times.”

Allied health staff noted that the multiple methods used by different clinician groups throughout the health care organization made it difficult to ensure reliable and correct communication methods were used: “Allied Health members are still using pagers whereas medical staff are not which makes communication difficult...appears to be their preferred method of communication...once I have a medical phone number rather than pager communication is greatly improved”.

Suggestions for improvements included using adaptations to existing hardware and software throughout the health care organization: “a “secure chat” platform through the EMR [electronic medical record] at a different health service and it works very well – a million times better, safer, quicker than paging”; “I cannot even get mobile reception here so I cannot even receive a call.”

## Discussion

This study attempts to fill the gap in literature on the use of clinical communication methods by clinicians. This survey

within a large health organization in Victoria received nearly a 20% response rate from all pager-carrying clinicians and an impressive rate of free-text comments. The subject matter of the survey clearly stimulated thought and comment despite the travails of the SARS-CoV-2 pandemic response.

The survey results indicate a high frequency and use of multiple methods of clinical communication using unapproved systems for all clinical groups. Survey results as well as free-text comments indicate a high level of dissatisfaction with existing workflows and methods for clinical communication, and time wasted with sending communications to incorrect clinicians. The use of workarounds including mobile phone use (SMS text messages) and unsecured programs such as WhatsApp for inter- and intra-disciplinary communication matches previous literature in which medical and nursing staff preferred using these systems due to improved communication efficiency and improved patient care due to minimization of delayed communication.<sup>3,6-8</sup> Workarounds reported by clinicians in this study are believed to be an attempt to minimize dissatisfaction and wasted time with existing clinical communication methods. While actual time wasted was reported as relatively low (under 5 minutes), this was considered unacceptable by clinicians providing patient care in a busy health service. Although alert fatigue is most commonly referred to in the context of modern communication and electronic medical records (EMRs), it is notable that the study participants were describing something similar in their use of legacy telephony and one-way pager systems (text only). One U.S. study found that this risk was not evenly distributed and key roles are particularly vulnerable.<sup>9</sup>

The quantitative data on time wasted suggests reasonable performance by the switchboard. However, if unnecessary calls were removed, one would expect a significant improvement in their other tasks in particular direct contact with the community.

Study results suggest that the sending of clinical images, including photographs of wounds or clinical results, is very high. The poor standard of practice seen in text-based communication is unfortunately mirrored in image-based communication. Clinicians felt they were unable to send images via approved methods, therefore have developed workarounds to do so to prevent missing clinical information or care delivery.

The combination of unpopular systems and inefficient use of those systems drives the workforce to use other platforms that are widely available, such as SMS and WhatsApp. There is a need to improve the uptake and use of the clinical communication systems or provide one. Unfortunately, unapproved methods of communication are generally easier to use, and clinicians have shown they are committed to providing quality patient care and will use workarounds to do so.

The qualitative data discussed related issues concerning communication methods and time wasted waiting for information. Clinicians provided comments not only about pagers, communication systems, communicating via the EMR, and the amount of time spent sending clinical communication to colleagues, but on the poor quality of messages they received and not receiving responses. Interestingly, many staff made

comparisons between the systems provided at the health care organization in which the survey was conducted and other health services. They implicitly and explicitly stated that they were aware of systems at other employers that they preferred and that their choice of employer is influenced by how easy it is to use both telecommunications and the EMR. As one medical staff member stated *"Please implement a tool similar to XXX. I've previously worked at [name of another health care organization] where they implemented XXX. Everyone was apprehensive about how difficult it would be to implement at first, but it was so easy and straightforward, and the app is super user-friendly."* These statements are in agreement with previous literature that show the link between ease of use of systems and workforce satisfaction.<sup>10,11</sup> Ensuring a satisfied workforce is not just a retention issue, but it results in better patient care and outcomes.<sup>12</sup>

This study has taken an early step in understanding the extent of clinical communication workarounds throughout the health care organization. To continue to comply with legislation, ensure a satisfied workforce, and provide quality patient care delivery there need to be systems in place that allow text-based and image communication that is implemented with minimal disruption to clinicians. Failure to do so leads to poor outcomes and drives our workforce to continue usage of unapproved systems like WhatsApp.

### Strengths and Limitations

This study included several strengths and limitations. The use of a multidisciplinary informatics team and surveying of multiple disciplines provided an in-depth examination of practices throughout the health care organization. There was also a large number of qualitative comments that provided further insight into clinicians' experiences, indicating good engagement and interest with the survey. Limitations included recruitment of staff via email and that survey questions were directed toward pager-carrying staff. Lower response rates were noted from non-pager-carrying nursing and midwifery staff generally and to certain questions in particular. Internal operational data suggest that different clinician groups have a lower rate of accessing organizational emails. Further investigation tailored to this extremely important non-pager-carrying workforce may be merited, as along with the inclusion of other health care organization workers who were not included in this study (e.g., switchboard, volunteers, ward clerks, and clinicians working in outpatient settings).

The survey questions for this study were developed internally by the Clinical Informatics team and therefore applicability to other health care organizations may be limited.

The culture of the health care organization, where clinicians work in multidisciplinary care teams, may have supported clinicians to provide honest feedback via the survey and admit the use of unapproved communication methods.

The implementation of new systems as part of the health care organization's response to the SARS-CoV-2 pandemic may have been another limitation, however, this study's survey questions were focused upon previously used and

approved communication methods. For several months throughout the data collection period a virtual care platform was implemented throughout the health care organization with both text and image capability to support SARS-CoV-2 pandemic-related clinical care. However, this platform was not implemented in all clinical areas or across all sites of the organization.

Why so much risky user behavior? A direct comparison of the dominant communications types (approved pager vs. unapproved SMS/WhatsApp messaging) may yield more answers. The qualitative responses delivered four clear themes that drove the users toward the unapproved: two-way communication, delivery notification, single/users-own devices, and image capability.

This study is limited to the largest health care organization in one state in Victoria; can the results be extrapolated to other systems? The fact is that the platform comparison really comes down to pager/switchboard versus smartphone platforms. Internationally, the use of mobile phones within the workplace is all but ubiquitous.<sup>13</sup> Communication applications utilized are free and the dichotomy described is not unique to Australia. While new communication platforms are constantly becoming available, the participants in this study do not seem to be very early adopters jumping to the latest offering. The preponderance of SMS and WhatsApp messaging suggests that clinicians will choose the best platform that their work colleagues have access to, rather than the best platform available.

## Conclusion

This study confirms that current communication between clinicians of the health care organization relies on personal devices and a mosaic of free unapproved platforms and applications. Multidisciplinary clinicians have voiced their concerns with the accessibility and usability of existing approved clinical communication systems throughout the health care organization. Workarounds are being used by all clinician groups to send both text and image clinical communications.

Survey responses indicated an engaged and informed health care workforce, with a strong desire to engage in safe, secure, and high-quality clinical communication.

There is a need to ensure that clinical communications comply with the health care organization and governing bodies' policies and procedures, as well as supporting clinicians to provide safe, high-quality patient care. Implications not only for patient care, but for medical, nursing, midwifery, and allied health workforce retention due to dissatisfaction with clinical communication systems must be addressed by health care organizations.

This study has illustrated how widespread the issue of communication preferences and use of unapproved platforms is. We hope this study stimulates further research internationally to expose what our well-intentioned health care workforces are doing, why they are doing it, and what can be done to stop them voting with their feet, or more accurately, given the ubiquitous smartphone, "Voting with their Thumbs."

## Clinical Relevance Statement

Secure communication systems provided by the health care organization may be poorly used by clinicians. Clinicians' workflows and clinical communication needs need to be considered by the health care organization to support high-quality patient care delivery.

## Multiple Choice Questions

1. What was the most commonly used platform to send clinical images by all professional groups?
  - a. Text message.
  - b. WhatsApp.
  - c. Facebook Messenger.
  - d. Webex.

**Correct Answer:** The correct answer is option a, text message. All clinicians used workarounds (unapproved clinical communication methods).

2. Which of the following clinician groups do not regularly hold pagers at this health care organization?
  - a. Medical.
  - b. Nursing.
  - c. Allied health.
  - d. All clinical staff hold pagers.

**Correct Answer:** The correct answer is option b, Nursing. Nursing staff do not regularly hold pagers within the health care organization due to the nature of their work (located in one clinical area for their shift).

### Protection of Human and Animal Subjects

The study was performed in compliance with the World Medical Association Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects and was reviewed by the health care organization's Institutional Review Board.

### Conflict of Interest

None declared.

### Acknowledgments

The authors thank the study participants, the Nursing and Midwifery Informatics Team members, Medical Informatics Team members, and T. Ivacic-Ramljak.

## References

- 1 Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. 2nd ed. Sydney, NSW; 2017
- 2 Barr NG, Randall GE, Archer NP, Musson DM. Physician communication via Internet-enabled technology: a systematic review. *Health Informatics J* 2019;25(03):919-934
- 3 Nguyen C, McElroy LM, Abecassis MM, Holl JL, Ladner DP. The use of technology for urgent clinician to clinician communications: a systematic review of the literature. *Int J Med Inform* 2015;84(02):101-110
- 4 Martin G, Khajuria A, Arora S, King D, Ashrafiyan H, Darzi A. The impact of mobile technology on teamwork and communication in

- hospitals: a systematic review. *J Am Med Inform Assoc* 2019;26(04):339–355
- 5 Elo S, Kyngäs H. The qualitative content analysis process. *J Adv Nurs* 2008;62(01):107–115
  - 6 Brady AM, Byrne G, Quirke MB, et al. Barriers to effective, safe communication and workflow between nurses and non-consultant hospital doctors during out-of-hours. *Int J Qual Health Care* 2017;29(07):929–934
  - 7 Ganasegeran K, Renganathan P, Rashid A, Al-Dubai SAR. The m-Health revolution: exploring perceived benefits of WhatsApp use in clinical practice. *Int J Med Inform* 2017; 97:145–151
  - 8 Wu R, Lo V, Morra D, et al. A smartphone-enabled communication system to improve hospital communication: usage and perceptions of medical trainees and nurses on general internal medicine wards. *J Hosp Med* 2015;10(02):83–89
  - 9 Hagedorn PA, Kirkendall ES, Spooner SA, Mohan V. Inpatient communication networks: leveraging secure text-messaging platforms to gain insight into inpatient communication systems. *Appl Clin Inform* 2019;10(03):471–478
  - 10 Wright KB, Abendschein B, Wombacher K, et al. Work-related communication technology use outside of regular work hours and work life conflict: the influence of communication technologies on perceived work life conflict, burnout, job satisfaction, and turnover intentions. *Manage Commun Q* 2014;28(04):507–530
  - 11 Feinberg J, Shaw S, Kashyap N, et al. Evaluating the impact of a new smartphone texting tool on patient care in obstetrics, an emergent healthcare setting. *Appl Clin Inform* 2019;10(05):879–887
  - 12 Tomo A, De Simone S. Exploring factors that affect the well-being of healthcare workers. *Int J Bus Manage* 2017;12(06):49–61
  - 13 Ventola CL. Mobile devices and apps for health care professionals: uses and benefits. *P&T* 2014;39(05):356–364