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ANALYSIS OF MANAGEMENT PRACTICE

OUTPATIENT LETTERS IN REAL TIME FOR BETTER PATIENT OUTCOMES

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ABSTRACT

The Sunshine Coast Hospital and Health Service commenced a six-month proof-of-concept to trial speech recognition and self-type software in 2020. This action was taken in response to an ageing medical transcription workforce; an increase in outpatient letters due to population growth and the novel coronavirus pandemic; and more timely transfer of care communication to GPs.

The proof-of-concept presented the health service with a unique opportunity as no other public hospital in Queensland had leveraged speech recognition or self-type software for the production and distribution of outpatient letters. The proof-of-concept trial provided 18 clinicians with the choice to type or dictate outpatient letters, electronically sign, and distribute to referring general practitioners (GPs) in one transaction.

The results of the proof-of-concept demonstrated a 39% uptake of speech recognition and self-type software, demonstrating an opportunity to supplement the medical transcription workforce to address the rising outpatient activity. The proof-of-concept also demonstrated an average reduction in transaction time of 25% from the baseline measure over the six-month trial period. This finding supports the timely transfer of communication to GPs. However, it will need to be carefully analysed against the participant frustrations of voice to text accuracy to minimise the risk of poor adoption.

KEYWORDS

artificial intelligence, dictation, self-type, medical transcription, outpatients

INTRODUCTION

Healthcare providers are seeking transformational change in the production of clinical documentation to improve workflow efficiencies as the demand for healthcare rises. In 2020, the Sunshine Coast Hospital and Health Service (SCHHS) embarked on a proof-of-concept to demonstrate front end speech recognition capability for the production and distribution of outpatient letters. This proof-of-concept was initiated to improve the transactional speed in the transfer of clinical information to general practitioners (GPs) and referring specialists to ensure continuity of care following hospital attendance. Delayed communication can lead to a lack of continuity of care and suboptimal care, as well as decreased patient and GP satisfaction levels. [1] A literature review undertaken by Kripalani et al. in 2007 of 753 observational studies and 18 controlled studies identified that 25% of discharge summaries were

never transmitted to the GP or referring specialist. [2] This outcome suggests that patients could be exposed to hospital readmission as a direct consequence of delays, non-transmission, or misplaced discharge summaries, placing unnecessary pressure on the health system.[2]
Whilst interventions to reduce the backlog of letters awaiting transcription, such as overtime, further business process education, and close monitoring and control of activity can relieve the short-term pressure on the health system, these interventions are not sustainable over a long period of time.[3] These interventions can lead to morale problems and are often manifested as an increase in staff absenteeism, low productivity, labour issues, health issues and general staff dissatisfaction.[3] Since the opening of the Sunshine Coast University Hospital in 2017, and its iterative expansion, there has been no increase in the medical transcription workforce despite rising outpatient activity associated with population growth and the novel coronavirus pandemic. With a projected two per cent decline in the medical transcription workforce between 2019 and 2029 due to retirement and a lack of emerging talent to balance this reduction, the future availability of a medical transcription workforce is a cause for concern.[4]

Supplementary to workforce challenges, clinician driven demands for digital health solutions are on the rise.[5] With Millennials and Generation Z (those born after 1980), also known as digital natives, making up a large segment of the medical workforce, the appetite for tech savvy solutions has reinforced this upward trend.[6] This cohort makes up 41% of the Australian working population.[7]

Digital natives born after 1980, have grown up in the digital age, and are attached to their mobile phone contrary to digital immigrants born before 1980 who would prefer to have a conversation in person.[6] Digital natives are exceedingly social online, adopt technology at a faster rate than digital immigrants and are fluent in multi-tasking.[6] By comparison, digital immigrants seek news via traditional channels such as print newspaper and prefer to focus on one task at a time.[6] In a healthcare setting, digital natives have a desire to simplify workflows and practices, connect with patients and healthcare providers using new technology to improve the overall healthcare experience.[6] The mid-point between the two groups has been dubbed by Wang et al. as digital fluency or digital transformation.[6] This is where legacy information communication and technology systems meet the digital age, combining knowledge and experience with innovative and user-friendly technology.

Whilst speech recognition for clinical documentation is increasing at a rapid rate, no public hospital in Queensland leverages speech recognition for the creation of outpatient letters. This gap presented a unique opportunity for the Sunshine Coast Hospital and Health Service to conduct research to understand if front end speech recognition technology could solve these business-based problems before a wide scale rollout was considered. A proof-of-concept trial was developed and implemented from December 2020 to May 2021 (Figure.1).

OBJECTIVES

This case study describes the introduction of a transformational change (the use of front-end speech recognition to produce clinical documentation) to improve workflow efficiencies and to identify the critical success factors likely to support future adoption of and sustained use of this technology. This proof-of-concept included: 1. review of the usability of the software; 2. performance of the software and technology in the healthcare environment; and 3. the method used by clinicians to enter information into the system. Feedback collected from participants about their experience of the trial was designed to identify the likely critical success factors in a wide scale rollout.

SETTING

Outpatients, Sunshine Coast Hospital and Health Service

PARTICIPANTS

The proof-of-concept trial provided 18 clinicians with the choice to type or dictate outpatient letters, electronically sign, and distribute to referring GPs in one transaction. All existing users of the Fluency for Transcription software were considered for inclusion in the proof-of-concept trial. Clinicians were excluded if they did not have a voice profile score of 85% or more based on the software vendors experience in the United States for optimal voice to text conversion accuracy.[8]

Participants completed 'onboarding' (including provision of a software license and handheld microphone) and training in December 2020. During the trial clinicians could choose to type or dictate outpatient letters, electronically sign, and distribute to referring GPs in one transaction and utilised the system for a three-month period (Phase 1). The proof-of-concept was extended for a further three months

(Phase 2) to provide additional technical support and to respond to feedback received during Phase 1 that it was deemed might otherwise prohibit future rollout of the technology.

METHODOLOGY

Measurement of trial outcomes used a mix of research methods including system-based metrics and interviews with participants (Appendix 1). The system-based metrics were extracted from the Fluency for Transcription software and manually cleansed to detect and correct inaccurate records from the data set. Baseline data was collected about clinicians' use of the Fluency for Transcription software six months prior to the trial and during the six-month proof-of-concept trial. A prescriptive analysis was used to understand what action would be undertaken to address problems identified during the trial.

OUTCOMES

SYSTEM USAGE

The proof-of-concept demonstrated that there was a higher uptake of the front-end speech recognition software compared to the self-type option.

Of the 18 participants included in the proof-of-concept; 13 participants chose to use the front-end speech recognition software, 12 used the self-type option, 3 of the 5 who chose not to use the front end speech recognition also did not use the self-type option (i.e. did not engage with either of the offered technologies) and all participants engaged with the medical transcription service. During the proof-of-concept period, 4,201 letters were produced: 976 (25%) used front end speech recognition, 659 (14%) used self-type and 2,566 (61%) used the medical transcription service. These findings (Table 1) demonstrate that if front-end speech recognition (25%) paired with self-type (14%) functionality was more broadly used across the organisation, it could achieve a 39% reduction in the number of outpatient letters requiring transcription, a positive outcome to address the challenge of the rising volume outpatient letters requiring transcription. The best-case scenario of 100% system usage was calculated by removing the participants who did not attempt to use the front-end speech recognition functionality from the analysis (Table 2), the use of front-end speech recognition is adjusted to 35% and self-type adjusted to 11%. A potential uptake of the technology of 46% would positively contribute to the workload reduction for the transcription workforce.

There are factors which may affect system usage rates. During software downtime associated with the speech recognition functionality, clinicians may revert to using the medical transcription service to ensure continuity of care is maintained in a timely manner. Further scenarios where clinicians may default to using the medical transcription service include low digital literacy levels or negative attitudes towards the technology because of frustrations experienced with using the technology.[9]

TABLE 1: USAGE OF DICTATION METHODS (ORIGINAL PARTICIPANT GROUP) – DECEMBER 2020 TO MAY 2021

participant reference	total jobs produced	number of jobs produced using front end speech recognition	% of jobs produced front end speech recognition	number of jobs typed directly number	% of jobs typed directly	jobs produced by other methods (*)	jobs produced by other methods %
participant 1	95.00	-	0%	-	0%	95.00	100%
participant 2	213.00	163.00	77%	40.00	19%	10.00	5%
participant 3	114	33.00	29%	4.00	4%	77.00	68%
participant 4	364.00	37.00	10%	-	-	327.00	90%
participant 5	236.00	218.00	92%	1.00	0%	17.00	7%
participant 6	47.00	-	-	-	-	47.00	100%
participant 7	102.00	46.00	45%	-	0%	56.00	55%
participant 8	418.00	55.00	13%	2.00	0%	361.00	86%
participant 9	32.00	5.00	16%	-	0%	27.00	84%
participant 10	472.00	20.00	4%	2.00	0%	450.00	95%
participant 11	532.00	63.00	12%	2.00	0%	467.00	88%
participant 12	51.00	-	0%	7.00	14%	44.00	86%
participant 13	198.00	-	0%	192.00	97%	6.00	3%
participant 14	188.00	57.00	30%	38.00	20%	93.00	49%
participant 15	438.00	111.00	25%	257.00	59%	70.00	16%
participant 16	52.00	25.00	48%	1.00	2%	26.00	50%
participant 17	372.00	-	-	-	-	372.00	100%
participant 18	277	143.00	52%	113.00	41%	21.00	8%
	4,201	**976**	**25%**	**659**	**14%**	**2,566**	**61%**

*Other methods may include front end speech recognition or self type where medical transcription service intervention was required.

TABLE 2: USE OF DICTATION METHODS (ADJUSTED TO EXCLUDE PARTICIPANTS WHO DID NOT USE SPEECH RECOGNITION) – DECEMBER 2020 TO MAY 2021

participant reference	total jobs produced	number of jobs produced using front end speech recognition	% of jobs produced front end speech recognition	number of jobs typed directly number	% of jobs typed directly	jobs produced by other methods (*)	jobs produced by other methods %
participant 2	213.00	163.00	77%	40.00	19%	10.00	5%
participant 3	114.00	33.00	29%	4.00	4%	77.00	68%
participant 4	364.00	37.00	10%	-	-	327.00	90%
participant 5	236.00	218.00	92%	1.00	0%	17.00	7%
participant 7	102.00	46.00	45%	-	0%	56.00	55%
participant 8	418.00	55.00	13%	2.00	0%	361.00	86%
participant 9	32.00	5.00	16%	-	0%	27.00	84%
participant 10	472.00	20.00	4%	2.00	0%	450.00	95%
participant 11	532.00	63.00	12%	2.00	0%	467.00	88%
participant 14	188.00	57.00	30%	38.00	20%	93.00	49%
participant 15	438.00	111.00	25%	257.00	59%	70.00	16%
participant 16	52.00	25.00	48%	1.00	2%	26.00	50%
participant 18	277.00	143.00	52%	113.00	41%	21.00	8%
	3,438	**976**	**35%**	**460**	**11%**	**2,002**	**54%**

TRANSACTION TIME

The proof-of-concept demonstrated an improvement in the processing time between outpatient letter creation and GP receipt.

Data on the transaction time per outpatient letter per participant (adjusted to exclude participants who chose not to use the front-end speech recognition software) was analysed for the six-month period (June to November 2020) prior to the proof-of-concept baseline and for the six months (December 2020 to May 2021) of the proof-of-concept trial (Phase 1 and 2) (Figure. 1). Prior to the proof-of-concept participants used only the medical transcription service to produce outpatient letters, however during the trial front-end speech recognition and self-type options were also available for use. The proof-of-concept trial demonstrated an average improvement (i.e., reduction in transaction time) of 25% from the baseline over the six-month trial period (Table 3). This suggests that GPs could receive outpatient letters within hours as opposed to days, emphasising the real time application and capability.

Of the 13 participants, 8 (62%) demonstrated a positive improvement (range 17% to 92%). Participant 5 demonstrated a significant positive improvement of 92% in transaction time by the end of the proof-of-concept trial. This participant used front end speech recognition functionality for 92% of transactions. The overall findings on transaction speed suggests GPs will receive outpatient letters 25% faster when hospital clinicians use front-end speech recognition software. These findings conclude that it is quicker for a clinician to speak and or self-type the letter when compared to using the medical transcription service. This is due to the medical transcription service requiring more workflow process steps (i.e., sending audio, letter is typed and returned to clinician for signing and is then dispatched to the GP and information system), (Figure.1) and subject to delays associated with the workload of the medical transcription service. The improvement in transactional speed could lead to improved patient outcomes through quicker medical reporting to the referring clinician for ongoing care.[1]

FIGURE 1 - PROCESS FLOW

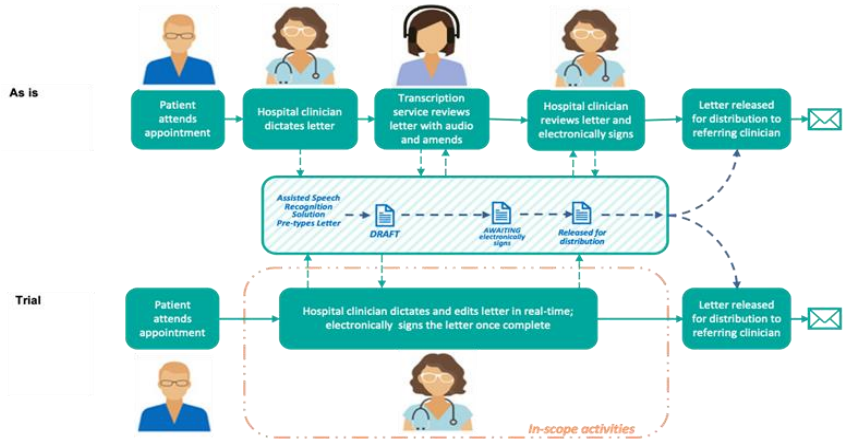

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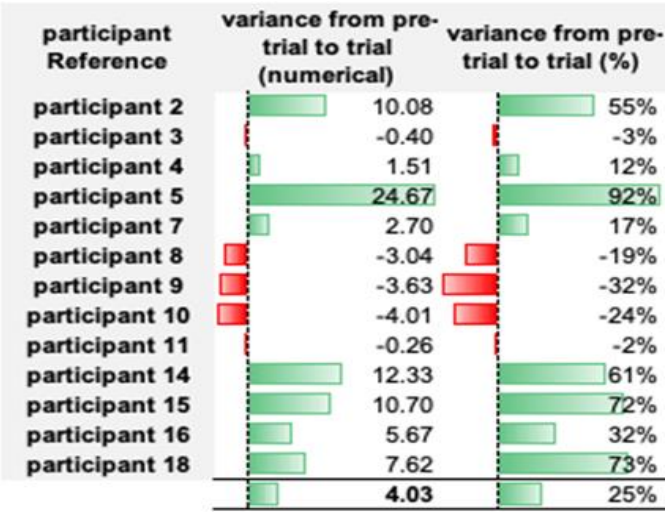
TABLE 3: TRANSACTION SPEED PER PARTICIPANT – BASELINE AND PROOF-OF-CONCEPT – JUNE 2020 TO MAY 2021



participant Reference	variance from pre-trial to trial (numerical)	variance from pre-trial to trial (%)
participant 2	10.08	55%
participant 3	-0.40	-3%
participant 4	1.51	12%
participant 5	24.67	92%
participant 7	2.70	17%
participant 8	-3.04	-19%
participant 9	-3.63	-32%
participant 10	-4.01	-24%
participant 11	-0.26	-2%
participant 14	12.33	61%
participant 15	10.70	72%
participant 16	5.67	32%
participant 18	7.62	73%
	4.03	25%

ADOPTION

A key lesson learned was that if a future rollout is approved, regular contact with clinicians will be required to ensure adoption and uptake rates are sustained.

Implementing new technology in healthcare can be complex and challenging as transformational change cannot occur without the support of the organisation. Therefore, those involved in leading change activities associated with introducing new technology must be prepared with the appropriate tools and change management techniques to ensure adoption of the new technology, processes, and culture. [11] Feedback received from participants through interview during Phase 1 of the proof-of-concept was that more adoption support, including the use of different techniques and approaches would have been beneficial. Suggestions from participants to enhance the adoption package were to include 'cheat sheets' for commonly used system words and establishing an outside of business hours support for clinicians as they often completed letters before or after clinics. As a result of this feedback, a medical transcription resource was deployed as part of Phase 2 of the proof-of-concept to provide additional 'at the elbow' support and adoption services and cheat sheets were developed. An extended hours adoption and support service will be a consideration for a full-scale rollout of the technology.

Two participants who initially used the front-end speech recognition functionality quickly transitioned back to using the medical transcription service due to voice to text conversion issues. The vendor involved in the proof-of-concept confirmed that the product can take up to 90 hours to learn a clinician's voice profile. Participants frequently commented that the translation of scientific words was excellent, however basic language translation was poor by comparison. This demonstrates that even clinicians who have a voice profile within the transcription software of 85% voice to text accuracy may still encounter frustrations.

Most participants agreed that integration with the ieMR system was outstanding as it provided pre-populated patient demographic information directly into the outpatient letter template, and allowed the option for clinicians to cut and paste clinical notes (when using the self-type option). Whilst participants felt that the handheld USB microphone provided quality transcription and was easy to use, many clinicians work across multiple facilities and often forgot to take the handheld microphone with them. Based on this feedback, the project supported clinicians to use the pre-existing vendor developed phone application in Phase 2, allowing clinicians the ability to dictate and process letters 'on the go' from any location.

PARTICIPANT CHARACTERISTICS

The top three (letters produced) participants of the front-end speech recognition functionality during the proof-of-concept were participant 2 (163 letters or 77%), participant 5 (218 letters or 92%) and participant 18 (143 letters or 52%). These participants had the three largest variances from baseline in terms of transactional time. Participant 2 improved by 55%, participant 5 by 92% and participant 18 by 73%. All three participants identify as digital natives. These findings illustrate the strong link between digital natives and adoption of digital technology and the

importance of digital natives to act as change advocates in the event of a future rollout.

CONCLUSIONS

Based on the positive benefits achieved through the proof-of-concept, it is recommended that the health service invest and progress an expansion of the technology to respond to increased healthcare demands associated with population growth. This recommendation includes the engagement of a change management and training focused delivery team to ensure adoption and benefits realisation is achieved.

To achieve digital fluency, the change management strategy will need to consider different strategies to meet different generational needs. Due to the time taken to build an accurate voice profile of 85% or more, hospital clinicians involved in the trial will be encouraged to dictate frequently used words into the software and continue to use the backend speech recognition functionality. Both actions will increase the accuracy of voice profiles to improve speech recognition. As the quality and efficiency of front-end speech recognition grows overtime, it is expected that the workload of the transcription service will reduce, allowing the organisation to manage the predicted decline in the transcription workforce. However, there will always be a need for transcribers to facilitate the delivery of training, support adoption associated with the speech recognition technology and to remediate technology errors.

ETHICS APPROVAL

In preparation of this case study, the following approvals were provided:

- The Prince Charles Human Research Ethics Committee – 20 May 2021 (Reference EC00168/ HREC/2021/QPCH/76081)
- Queensland University of Technology Administration Review – 3 June 2021 (Reference 2021000376)
- Site Specific Approval via Sunshine Coast Hospital and Health Service – 16 June 2021 (Reference SSA/2021/QSC/76081).

References

1. Schwarz CM, Hoffmann M, Schwarz P, Kamolz L-P, Brunner G, Sendlhofer G. A systematic literature review and narrative synthesis on the risks of medical discharge letters for patients' safety. BMC Health Services Research. 2019 March; 19(1): 158.
2. Kripalani S, LeFevre F, Phillips CO, Williams MV, Basaviah P, Baker DW. Deficits in communication and information transfer between hospital-based and primary care physicians: implications for patient safety and continuity of care. JAMA. 2007 February; 297(8): 831–41.
3. Wong K, Chan AHS, Ngan SC. The effect of long working hours and overtime on occupational health: A meta-analysis of evidence from 1998 to 2018. International Journal of Environmental Research and Public Health. 2019 June;16(12), 2102.
4. U.S. Bureau of Labor Statistics [Internet]. Occupational Outlook Handbook: Medical Transcriptionists. 9 April 2021 [cited 2021 August 14]; Available from https://www.bls.gov/ooh/healthcare/medical-transcriptionists.htm
5. Health Informatics Society of Australia [Internet]. What is Digital Health? And why does it matter? 2 Dec 19 [cited 2021 Aug 14]; Available from https://www.hisa.org.au/wp-content/uploads/2019/12/What_is_Digital_Health.pdf
6. Wang Q, Myers MD, Sundaram D. Digital Natives and Digital Immigrants. Business & Information Systems Engineering. 2013 Nov; 5: 409–419.
7. Australian Bureau of Statistics (ABS). Population by age and sex – national. Table 6 – Age distribution by sex – preliminary 30 June 2020. [Internet] Canberra, ACT; 20 Dec 20 [cited 2021 Aug 14]. Available from: https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/dec-2020
8. Sunshine Coast Hospital and Health Service, 2021. Business Case - Front End Speech Recognition.
9. Office of the eSafety Commissioner [internet]. Understanding the digital behaviours of older Australians. May 2018 [cited 2021 Sept 18]; Available from https://www.esafety.gov.au/sites/default/files/2019-08/Understanding-digital-behaviours-older-Australians-summary-report-2018.pdf
10. Poder TG, Fisette JF, Déry V. Speech Recognition for Medical Dictation: Overview in Quebec and Systematic Review. Journal of Medical Systems. 2018 April; 42(5), 1-8.
11. Van Zeebroeck N, Kretschmer T, Bughin, J. Digital "is" Strategy: The Role of Digital Technology Adoption in Strategy Renewal. IEEE Transactions on Engineering Management. 2021 June; 1–15.

APPENDIX 1: STRUCTURED INTERVIEW QUESTIONS

1. Do you use front end speech recognition software?
2. Have you been using both proof-of-concept functionality and the current business as usual process with the medical transcription service?
3. Do you use self-type software?
4. Do you use your mobile phone via the microphone application for transcription?
5. What is the average time to produce a letter using the front-end speech recognition software?
6. Do you find front end speech recognition more efficient than medical transcription service?
7. What time of the day do you produce your letters?
8. Do you have any issues with the microphone?
9. Has the transcription converted to text accurately when using the front-end speech recognition software?
10. How many corrections are undertaken on average per letter?
11. Do you find the final version (print view) is behaving and appearing as expected?
12. Do you use the patient appointment schedule tab within the ieMR application?
13. Do you cut and paste from the ieMR application?
14. Are you needing to use the service of transcription team (including ability to push as letter to the transcription team)?
15. Is your experience positive with the front-end speech recognition software?
16. How did you find the training? Any feedback?
17. Have you continued to use the front-end speech recognition software or reduced your usage? If you're not using the front-end speech recognition software, why?
18. Did the time to use the front-end speech recognition software incur any impact on your appointments with patients?
19. Do you support the dis-benefit of additional time for the clinician to produce the letters is worth the benefit of letters getting to referring doctors quicker?
20. Are you having any issues with Fluency Flex failing when my Fluency Direct application is not in use?
21. Any issues with letters being produced with spelling errors, missing capitals, missing spaces, dot points (or adding in extra dot points). Do you know about the hold queue?