



# Electronic transmission of prescriptions in primary care: transformation, timing and teamwork

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## ABSTRACT

**INTRODUCTION:** During the coronavirus disease 2019 (COVID-19) pandemic lockdown in New Zealand in March 2020, there was a rapid shift to virtual consultations in primary care. This change was supported by system adjustments to enable electronic transmission of prescriptions without a handwritten signature if they met certain security criteria. International research suggests potential for unintended consequences with such changes, so it is important to understand the effect on professional practice in New Zealand general practice and community pharmacy.

**AIM:** The purpose of this study was to undertake a preliminary exploration of the experiences of New Zealand general practitioners and community pharmacists when prescriptions are transmitted electronically directly from prescriber to pharmacy.

**METHODS:** Semi-structured interviews with a purposive sample of four pharmacists and four general practitioners gathered qualitative data about their experiences of the shift to electronic transmission of prescriptions. Participants' perceptions of effect on professional workflow, interprofessional interactions between general practitioners and pharmacists, and interactions with patients were explored. Interviews were audio-recorded, and the data analysed thematically using an inductive approach.

**RESULTS:** Four themes were identified: workflow transformation; mixed impact on interactions with patients; juggling timing and expectations; and new avenues for interprofessional communication (with some cul-de-sacs).

**DISCUSSION:** Both general practitioners and pharmacists experienced transformational changes to workflow. This was positive for general practitioners due to saved time and increased work flexibility. Pharmacists noted potential benefits but also some challenges. To fully reap teamwork benefits, more work is needed on managing the timing issues and patient expectations, and to refine the new modes of communication between health-care practitioners.

**KEYWORDS:** General practice; community pharmacies; primary health care; telemedicine; electronic prescribing, workflow.

## Introduction

Electronic prescribing generally describes the process in which the traditional paper prescription is replaced by a system that enables a prescription to be created and transferred to a pharmacy

electronically. There is variation in technical architecture and implementation of electronic prescribing approaches internationally.<sup>1–3</sup>

In New Zealand (NZ), paper prescriptions generated by computer and physically signed by prescribers has

been business-as-usual in primary care. The New Zealand Electronic Prescribing Service (NZePS) added a layer whereby the prescription data generated by prescribers using the NZePS were sent electronically to a central transaction broker. Paper prescriptions with unique barcodes were generated at the same time, signed by the prescriber, and given to patients to present to the pharmacy of their choice. Pharmacists could process requests manually using the information provided on paper prescriptions, or they could scan barcodes to retrieve electronic prescriptions from the central server. This process is depicted in Figure 1.

The vision described for the NZePS (a component of the eMedicines programme)<sup>4</sup> is that patients will benefit from improvements in patient safety and quality of care, such as reduced risk of transcribing errors during dispensing, better communication between prescriber and pharmacist, improved ability to evaluate and address patient medicines adherence issues, and improved quality of patient medication history information.<sup>5</sup>

Limited national roll-out of the NZePS began in 2012, but uptake was slow. By the beginning of 2020, ~30% of general practices were set up to use the NZePS. As part of the NZ response to the COVID-19 pandemic, there was a substantial shift

### WHAT GAP THIS FILLS

**What is already known:** Electronic transmission of prescriptions has the potential to improve efficiency, safety and convenience for health-care practitioners and patients, but it can have unintended consequences.

**What this study adds:** Electronic transmission of prescriptions directly from prescriber to pharmacy in New Zealand had a transformative effect on the workflow of both general practitioners and community pharmacists. There is opportunity for further transformation to support communication between general practitioners and community pharmacists, but refinement of the systems is needed.

to virtual consultations in primary care. This created an urgent need to facilitate sending prescriptions electronically directly to pharmacies.

Although not originally part of the NZePS process, tests had been underway of the transmission of electronic prescriptions without a physical signature. This was enabled by a Director General of Health waiver to the Medicines Act requirement for a physical (handwritten ink) signature of the prescriber on a prescription, provided certain criteria were met.<sup>6</sup> The waiver was expanded nationally, and adaptations made to general practice patient management systems (electronic patient record than prescribing software)

Figure 1. Process with the New Zealand Electronic Prescribing Service (NZePS) when a patient takes their prescription to the pharmacy.

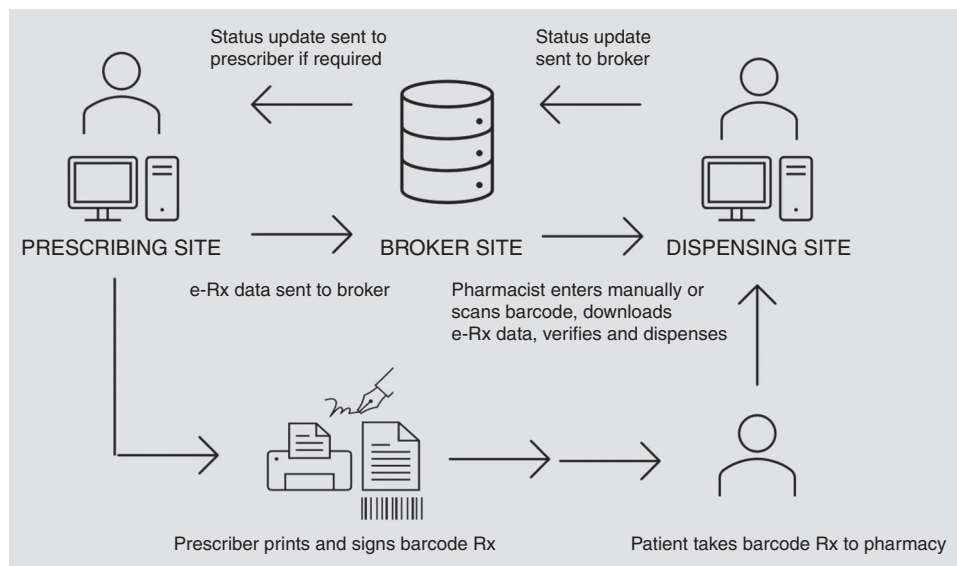
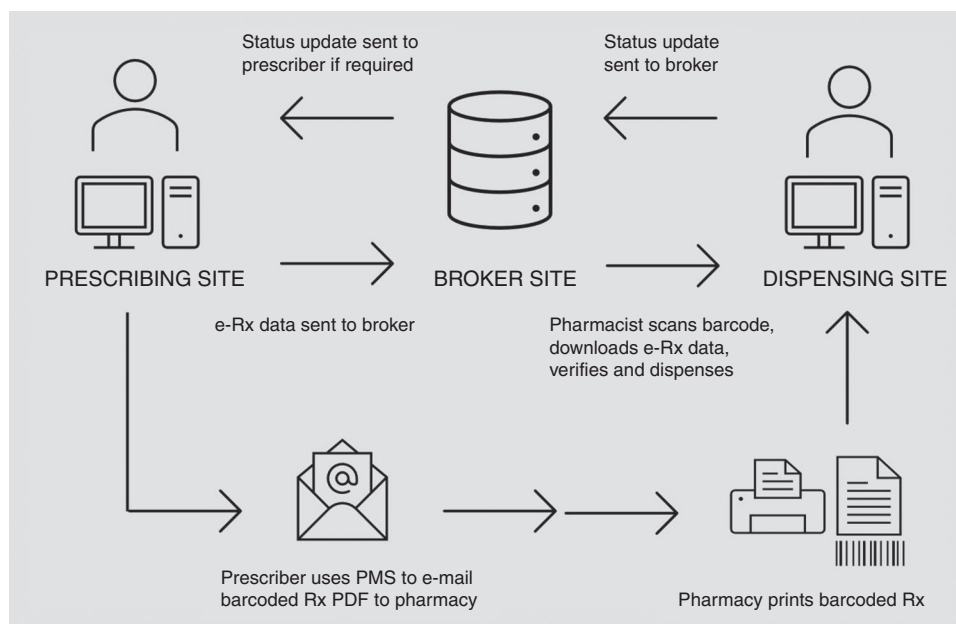


Figure 2. Process with the New Zealand Electronic Prescribing Service (NZePS) with direct electronic transmission of signature-exempt prescription to a pharmacy (not for controlled drugs which still require a physically handwritten prescriber signature).



to enable prescriptions to be emailed directly to pharmacies (Figure 2). By June 2020, 80% of general practices were signed up to the NZePS.<sup>5</sup>

International experience suggests some improvements achieved by the electronic transmission of prescriptions can be offset by unintended consequences and the introduction of new issues.<sup>7–9</sup> It is therefore important to evaluate local implementation to understand the effect of the change on practice, so that adjustments can be made if needed to avoid compromising patient care.

The aim of this study was to explore the experiences of NZ general practitioners (GPs) and community pharmacists when prescriptions are transmitted electronically directly from prescriber to pharmacy rather than being printed, signed by the GP and taken to the pharmacy by the patient or faxed. Although the NZePS underpins and enables the electronic process, this study was not focused on NZePS *per se*.

## Methods

A purposive sample of GPs and community pharmacists was recruited by researcher invitation to

cover a range of health-care practitioner and practice characteristics.

Qualitative data were collected by face-to-face semi-structured interviews. Interview objectives were to gain an understanding of the effects of direct conveyance of the prescription electronically on professional workflow, interprofessional interactions and communication between prescribers and pharmacists, and interactions between health practitioners and patients. Interview questions therefore focused on these three areas (see interview guide – Appendix 1). Sufficient demographic data about participants and their practice settings were collected to provide an indication of their characteristics.

The interviews were conducted by C.C. and digitally recorded with participant consent. An inductive thematic analysis of the qualitative data collected was undertaken.<sup>10</sup> The final thematic framework was discussed and agreed by all three authors.

Māori consultation was undertaken according to the University of Otago policy. Ethical approval was obtained from the University of Otago Human Ethics Committee (Reference number D20/330).

Table 1. Participant and practice demographics

	Years in General Practice	Patient Management System	Enrolled population
GP 1	25	MedTech32	8500
GP 2	35	MedTech32	7000
GP 3	22	MedTech Evolution	3700
GP 4	10	MedTech32	17,000
	Years in Community Pharmacy	Patient Management System	# Prescriptions / day
CP 1	3	TONIQ	250–300
CP 2	8–9	TONIQ	750–1000
CP 3	30	RxOne	250–300
CP 4	3	TONIQ	300–400

CP, Community Pharmacist; GP, General Practitioner.

## Results

Four GPs (all male) and four community pharmacists (three female, one male) were interviewed between October and December 2020. They were all located in the Wellington region, apart from one pharmacist who was located in a small town in the upper North Island (interview conducted using Zoom video conferencing software).

Interview duration ranged from 34 to 78 min (average 49 min).

Key participant and practice demographics are presented in Table 1. Inductive thematic analysis of the interview data identified four themes, which are described below with illustrative quotes.

### Workflow transformation

The change to electronic prescription transmission direct from prescriber to pharmacy had a transformative effect on the workflow of the participants. For GPs, the transformation has been largely positive, with key benefits being time saved and increased work flexibility:

‘Huge [impact on workflow]. Prior to this I could not do prescriptions from home ... I’d have to wait till I was physically in the practice to be able to print out the script, sign, and then dish it out to the admin office for them to either fax it off or call the patient to pick it up whereas now I just [click] and it’s away.’ [GP 4]

Although there has also been substantial change in the workflow experience for community pharmacists, the positives tend to have been offset by new challenges created.

A key positive for pharmacist workflow was the opportunity to get ahead on the dispensing process. When everything went smoothly, there was potential for the medicines to be ready for collection when patients arrived at the pharmacy.

‘I find it really easy to process it all cos we get like 15 odd scripts when we first come in in the morning, so I just print them all out and then we get on top of it...’ [Pharmacist 1]

However, positives were offset by some negatives such as non-collection of dispensed items.

Pharmacist clinical review of prescriptions in relation to the patient’s history does not appear to be well supported by the software when a prescription barcode is scanned:

‘Normally when I’m doing a prescription, I would bring up a patient [on the pharmacy computer], get an overview of their history and then I would go ahead with the script but with NZePS you scan it, and you can’t see the history until you’re finished. You specifically have to go back...’ [Pharmacist 2]

Although saving time is a benefit for GPs, one participant also noticed that the increased speed meant they had to build in steps to ensure they were still checking what they had prescribed.

'Whereas before when I was printing something off and putting my signature on it and taking it to the fax machine ... my checking process would be looking at the piece of paper, so I've had to make a conscious effort to read it very carefully before hitting 'send'.' [GP 3]

### Mixed effect on interactions with patients

GP participants observed no meaningful effect on their interactions and felt it was more convenient for patients. They did not use paper prescriptions as a communication tool in their consultations; prescriptions were considered more as an administrative detail.

'I'd rather the piece of paper they're holding, and reading, is the information about their disease unless the prescription is fairly complicated like a reducing dose or an escalating dose of something. But almost always where I work the pharmacist does that mahi [work].' [GP 3]

Although both GPs and pharmacists agreed it was more convenient for patients when the system worked and the medicine was ready, pharmacists expressed mixed views on the effect of the change on their interactions. Two perceived little effect, but the other two commented on lost opportunities to build rapport and receive information from patients before dispensing.

'It's amazing how much information we glean from the patient of changes, brand, all of that. So we lost that source of information for us.' [Pharmacist 3]

'I think we still interact with patients the same way, you just miss that initial [interaction], but you make up for it [later] with your counselling and ... [the patients] seem satisfied.' [Pharmacist 1]

### Juggling timing and expectations

A key challenge of the new process related to getting the timing right, understanding the timing and managing patient expectations.

'I've noticed recently the patients would see the doctor and then come straight away but the prescription just hasn't turned up on our end and they would expect it. They would say but the

doctor sent it while I was there, why isn't it here?' [Pharmacist 1]

'If I had a better idea of what the processing time was ... Some will just go shopping and then come back and collect it. But if it's going to take 2 hours ... what I've generally done is said take the hard copy through next door because that will take priority, that's what I'm assuming.' [GP 1]

Figuring out these delays was a new type of issue to deal with:

'Particularly initially if [the prescription] wasn't there it was unclear which part of the chain had failed. Was it that we'd sent it to the wrong pharmacy? Was it that the e-mail system was hooked up and it hadn't sent off the e-mails?' [GP 2]

### New avenues for communication, but some cul-de-sacs

Participants generally agreed that interactions between pharmacists and GPs had not been adversely affected; however, one participant suggested that relationships between the wider pharmacy and medical centre staff may have been tested because they may be more involved in trouble-shooting missing or delayed prescriptions.

There were examples of use of the new channels for practitioner-to-practitioner communication, including letting pharmacists know that a dose change was intentional, to request pharmacists' help to explain a complicated dosing regimen or explain about withholding medication in acute illness:

'We've got some patients with reduced renal function who are on metformin, for example, and if they were to be dehydrated or get gastro you want them to stop their metformin; those sorts of things that you just cut and paste into Doctor Info [facility to send message to pharmacist].' [GP 3]

In some cases, the tools embedded in the system were used by prescribers to request that pharmacists communicate to patients certain information (eg the need for a blood test or blood pressure check). However, it also seemed that some tools were often not used due to unknowns and even 'dead-ends', where only a certain number of communication exchanges were possible.

‘They can send us a message as well but I cannot reply to that particular message. It’s not a two-way communication. ... they don’t know that we’ve read it or not, and they don’t know our response until a few days later a new prescription turns up in their pharmacy. So, a way for us to [say] ... oh yep, I’ll change this.’ [GP 4]

Unknowns included where responses to messages end up:

‘We don’t know what happens to it, whether they only see that note if they go back into that patient, does it only come up for that prescription?’ [Pharmacist 4]

Similarly, when asked about the possibility of replying to the email that had been used to send the prescription, one pharmacist commented they were unsure whether the reply would get to the individual doctor.

Despite GP participants commenting on their wish for pharmacists to be able to contact them when needed for clarifying prescriptions, pharmacists still mentioned experiencing difficulty with this. Participants were generally hopeful for the potential for new electronic communication solutions:

‘It’s quite hard to reach a doctor so it would be quite nice to have some sort of communication method to interact with them without having to bother them ... It would have to be collaborative. You’d have to talk about it to make sure everyone is on board with it.’ [Pharmacist 1]

‘It would be good if there was a good system for those sorts of communications. Nothing complicated but, you know, actually you’ve got the wrong quantity here, can you please amend? It ought to be able to be done electronically...’ [GP 2]

A challenge is understanding the implications on each other and limitations of the tools that affect each other’s practise:

‘It’s actually quite good talking to the GPs saying so this is how we’re struggling. OK that makes sense why it’s happening at your end because you don’t know it pushed send so you keep pushing send, which is cancelling the one we’ve got... It’s almost like you need to get a pharmacy computer and a GP computer next to each other just to see what happens.’ [Pharmacist 4]

## Discussion

The findings of this study suggest that enabling electronic transmission of prescriptions direct from prescriber to pharmacy has had a transformative effect on the workflow of NZ GPs and community pharmacists. However, certain areas need attention if the positives are to be embedded and expanded, and negatives mitigated. Local evaluation is important because of the influence of the technical systems used by health-care practitioners and the potential for unintended consequences and new issues.<sup>9,11</sup> The substantial uptake of NZePS during the pandemic response to enable electronic transmission of prescriptions accentuates the need for evaluation and refinement now more than ever.

There were both positives and negatives for pharmacists’ workflow. One key area requiring resolution is ensuring that the systems underpinning the change to electronic transmission are not only designed to increase dispensing efficiency, but also to support pharmacists’ clinical checking processes. We found that it was not easy for pharmacists to review the patient’s history before dispensing, which was consistent with findings internationally reported in as early as 2012,<sup>12</sup> highlighting the need to learn from others’ experiences. Systems that facilitate clinical review before dispensing will also be needed to make use of the extended roles of pharmacy technicians in final accuracy checking of dispensed products.<sup>13</sup>

Similarly, although saving time was a major benefit for GPs, the effect of speeding up the prescribing process may need consideration from a professional practice perspective. One participant described the need to build in an intentional slow moment to review the final prescription before clicking ‘send’. Training and ongoing support have been identified as important to ensure systems can best support safe prescribing.<sup>14,15</sup> GPs appreciated the increased work flexibility of being able to send prescriptions electronically. This may help explain a recent Australian survey finding of a strong association between physician use of digital health technology and high job satisfaction and work–life balance.<sup>16</sup>

For GP participants, there was little perceived change in interactions with patients. International research suggests that patients appreciate the



improved convenience of electronic prescription transmission.<sup>17</sup> Early reports of the impact of virtual consultations in NZ indicate the likelihood of a similar finding here.<sup>18,19</sup> However, the mixed views of pharmacists about the impact of the change on patients, together with the inherent potential for variable patient experiences implied by the ‘juggling timing and expectations’ theme, indicate further investigation is warranted. Understanding and resolving the issues of timing and expectations, such as patients arriving in the pharmacy before the prescription, is important to preserve relationships and successfully consolidate this new process. Delays in pharmacies receiving prescriptions have been reported internationally and there may be simple technological fixes such as ensuring prescriptions are sent in real time rather than batches.<sup>7</sup>

Some pharmacists were mindful of the reduced number of patient interactions potentially limiting opportunities for relationship building and information exchange. This concern has also been identified by patients in a US study of their perceptions of electronic transmission of prescriptions.<sup>20</sup> However, other participants perceived minimal impact. It is possible that there may be benefits from a single but longer block of time with the patient. Given the potential role of pharmacist-patient relationships in optimising outcomes from medicines, how time with patients is used is an important consideration for professional practice.<sup>21,22</sup>

Participants in this study described encouraging examples of the communication tools embedded in the systems being used for interprofessional collaboration. The need for a team approach to communicating about medicines was highlighted by recent studies undertaken in Hawkes Bay.<sup>23,24</sup> The inclusion of the indication on prescriptions is another communication opportunity, enabled by technology, that has been previously identified as helping pharmacists reinforce physicians’ patient education.<sup>9,25</sup>

Pharmacists and GPs both felt the opportunity for the systems to deliver transformation in prescription-related communication practices between prescribers and pharmacists was yet to be fully realised. Although some tools were built in, participants described pitfalls such as not knowing where messages ended up or when they had been read, and a limited number of interchanges.

Clarification of prescription issues is one of the most common communications between pharmacists and GPs, and multiple factors contribute to making this currently suboptimal and more time-consuming than necessary,<sup>26–28</sup> so the benefits of improving the communication technology are potentially substantial for interprofessional interactions and relationships. Providing a channel for efficient, effective communication about prescription issues could create time and opportunity for more collaboration on medicines optimisation. In the future, there may be opportunity to include patients as well with tools such as the shared electronic medication plans described in a recent Swiss study.<sup>29</sup>

A key strength of this study was combining the perspectives of both GPs and pharmacists to provide a holistic understanding in contrast to the professional silos common in health care. We acknowledge that including perspectives of patients would provide an invaluable focus for future investigations. Drawing data from a small purposive sample is a limitation.

At policy level, an integrated approach to evaluation and governance that brings together key stakeholders such as prescribers, dispensers, software developers and patients will help to ensure the current system continues to evolve to meet user needs and support patient safety.

## Conclusions

The change to electronic transmission of prescriptions direct from prescriber to pharmacy is transforming workflow in NZ primary health care. Further work is needed to fully realise the potential for electronic transformation of prescription-related team communication. Likewise, there appears to be room for further streamlining to smooth timing issues, which may have an effect on patient experience.

## Competing interests

The authors of this paper have no competing interests to declare.

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## Data availability

The data that support this study will be shared upon reasonable request to the corresponding author.

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## References

- Bruthans J. The state of national electronic prescription systems in the EU in 2018 with special consideration given to interoperability issues. *Int J Med Inform.* 2020;141:104205. doi:10.1016/j.ijmedinf.2020.104205
- Aldughayfiq B, Sampalli S. Digital health in physicians' and pharmacists' office: a comparative study of e-prescription systems' architecture and digital security in eight countries. *OMICS.* 2021;25(2):102–22. doi:10.1089/omi.2020.0085
- Health Information and Quality Authority. E-prescribing and electronic transfer of prescriptions: an international review. 2012. [cited 2021 April 1]. Available from: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.470.2747&rep=rep1&type=pdf>
- Ministry of Health. eMedicines. Wellington: Ministry of Health. [cited 2021 April 1]. Available from: [www.health.govt.nz/our-work/digital-health/other-digital-health-initiatives/emedicines](http://www.health.govt.nz/our-work/digital-health/other-digital-health-initiatives/emedicines)
- Ministry of Health. New Zealand e-Prescription Service. Wellington: Ministry of Health. [cited 2021 April 1]. Available from: [www.health.govt.nz/our-work/digital-health/other-digital-health-initiatives/emedicines/new-zealand-eprescription-service](http://www.health.govt.nz/our-work/digital-health/other-digital-health-initiatives/emedicines/new-zealand-eprescription-service)
- Ministry of Health. Signature Exempt Prescriptions – Frequently Asked Questions. Wellington: Ministry of Health. [cited 2021 April 1]. Available from: [www.health.govt.nz/our-work/digital-health/other-digital-health-initiatives/emedicines/new-zealand-eprescription-service/signature-exempt-prescriptions-and-remote-prescribing](http://www.health.govt.nz/our-work/digital-health/other-digital-health-initiatives/emedicines/new-zealand-eprescription-service/signature-exempt-prescriptions-and-remote-prescribing)
- Nanji KC, Rothschild JM, Boehne JJ, et al. Unrealized potential and residual consequences of electronic prescribing on pharmacy workflow in the outpatient pharmacy. *J Am Med Inform Assoc.* 2014;21(3):481–6. doi:10.1136/amiajnl-2013-001839
- Gilligan AM, Miller K, Mohny A, et al. Analysis of pharmacists' interventions on electronic versus traditional prescriptions in 2 community pharmacies. *Res Social Adm Pharm.* 2012;8(6):523–32. doi:10.1016/j.sapharm.2011.12.005
- Lanham AE, Cochran GL, Klepser DG. Electronic prescriptions: opportunities and challenges for the patient and pharmacist. *Adv Health Care Technol.* 2016;2:1–11.
- Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* 2006;3(2):77–101. doi:10.1191/1478088706qp0630a
- Odukoya OK, Chui MA. E-prescribing: a focused review and new approach to addressing safety in pharmacies and primary care. *Res Social Adm Pharm.* 2013;9(6):996–1003. doi:10.1016/j.sapharm.2012.09.004
- Odukoya OK, Chui MA. Relationship between e-prescriptions and community pharmacy workflow. *J Am Pharm Assoc.* 2012;52(6):e168–74. doi:10.1331/JAPhA.2012.12066
- Napier P, Norris P, Braund R. Introducing a checking technician allows pharmacists to spend more time on patient focused activities. *Res Social Adm Pharm.* 2018;14(4):382–6. doi:10.1016/j.sapharm.2017.05.002
- Brown CLR, Slee K, Coleman A, et al. A literature review of the training offered to qualified prescribers to use electronic prescribing systems: why is it so important? *Int J Pharm Pract.* 2017;25(3):195–202. doi:10.1111/ijpp.12296
- Kivekäs E, Enlund H, Borycki E, Saranto K. General practitioners' attitudes towards electronic prescribing and the use of the national prescription centre. *J Eval Clin Pract.* 2016;22(5):816–25. doi:10.1111/jep.12548
- Zaresani A, Scott A. Does digital health technology improve physicians' job satisfaction and work-life balance? A cross-sectional national survey and regression analysis using an instrumental variable. *BMJ Open.* 2020;10(12):e041690. doi:10.1136/bmjopen-2020-041690
- Schleiden LJ, Odukoya OK, Chui MA. Older adults' perceptions of e-prescribing: Impact on patient care. *Perspect Health Inf Manag.* 2015;12:1d.
- Imlach F, McKinlay E, Middleton L, et al. Telehealth consultations in general practice during a pandemic lockdown: survey and interviews on patient experiences and preferences. *BMC Fam Pract.* 2020;21(1):269. doi:10.1186/s12875-020-01336-1
- Health Quality and Safety Commission. A survey of patient experience in New Zealand during the first COVID-19 lockdown. [cited 2021 April 1]. Available from: [www.hqsc.govt.nz/our-programmes/health-quality-evaluation/projects/patient-experience/covid-19-patient-experience-survey/survey-results/](http://www.hqsc.govt.nz/our-programmes/health-quality-evaluation/projects/patient-experience/covid-19-patient-experience-survey/survey-results/)
- Frail CKK, Snyder ME. Patient perceptions of e-prescribing and its impact on their relationships with providers: a qualitative analysis. *J Am Pharm Assoc.* 2014;54(6):630–3. doi:10.1331/JAPhA.2014.13176
- Hikaka J, Jones R, Hughes C, Martini N. "It is through shared conversation, that I understand" – Māori older adults' experiences of medicines and related services in Aotearoa New Zealand. *N Z Med J.* 2020;133(1516):33–46.
- Sangriry SS, Bhansali AH, Mhatre SK, Sawant RV. Influence of patient perceived relationship with pharmacist and physician and its association with beliefs in medicine. *J Pharm Health Serv Res.* 2017;8(2):123–30. doi:10.1111/jphs.12172
- Vicary D, Hutchison C, Aspden T. Avoiding acute kidney injury in primary care: attitudes and behaviours of general practitioners and community pharmacists in Hawke's Bay. *J Prim Health Care.* 2020;12(3):244–56. doi:10.1071/HC19106
- Vicary D, Hutchison C, Aspden T. Demonstrating the value of community pharmacists in New Zealand educating a targeted group of people to temporarily discontinue medicines when they are unwell to reduce the risk of acute kidney injury. *Int J Pharm Pract.* 2020;28(6):569–78. doi:10.1111/ijpp.12666
- Whaley C, Bancsi A, Ho JM-W, et al. Prescribers' perspectives on including reason for use information on prescriptions and medication labels: a qualitative thematic analysis. *BMC Health Serv Res.* 2021;21(1):89. doi:10.1186/s12913-021-06103-1
- Smith M, Sprecher B. Pharmacy communications with physician offices to clarify prescriptions. *J Am Pharm Assoc.* 2017;57(2):178–82. doi:10.1016/j.japh.2016.12.072
- Trausch N, Green JA. Direct observation of telephone communication between community pharmacies and prescribers in New Zealand. *Int J Clin Pharm.* 2018;40(5):1005–9. doi:10.1007/s11096-018-0687-8
- Löffler C, Koudmani C, Böhmer F, et al. Perceptions of interprofessional collaboration of general practitioners and community pharmacists – a qualitative study. *BMC Health Serv Res.* 2017;17(1):224. doi:10.1186/s12913-017-2157-8
- Bugnon B, Geissbühler A, Bischoff T, et al. Improving primary care medication processes by using shared electronic medication plans in Switzerland: lessons learned from a participatory action research study. *JMIR Form Res.* 2021;5(1):e22319. doi:10.2196/22319



## Appendix 1. Semi-Structured Interview Schedules

SEMI-STRUCTURED INTERVIEW SCHEDULE  
for general practitioners

### Introduction TO THE INTERVIEW

Hello, I'm Chloe Campbell, a Senior Research Fellow from the Department of Primary Health Care and General Practice at the University of Otago in Wellington.

Thank-you for your time in participating in this research. [Check have signed consent form]

As mentioned in the information sheet, we are exploring the experiences of general practitioners and pharmacists with electronic transmission of prescriptions. I'll be asking about your experiences and views on how sending prescriptions electronically affects your workflow, communication with pharmacists, and your interactions with patients.

I'm just going to start with some quick demographic questions...

### DEMOGRAPHICS

Male / Female / Gender diverse
How many years have you been working in general practice?
Number of GPs in the practice
Enrolled population of the practice
Practice location: urban, suburban, rural
Co-located with a pharmacy?
Patient management system used

Before I get into the main part of the interview, I just want to clarify what I mean when I say transmitting prescriptions electronically.

We are really interested in methods such as email direct from your PMS (or some other electronic method I don't know about yet), but not prescriptions you send by fax machine or that are taken to the pharmacy by the patient. This is because fax and patient are 'traditional' methods, and it is the shift to electronic transmission of prescriptions that we are most interested in.

I do recognise that some prescriptions that you fax or give to a patient will have an NZePS barcode that the pharmacy will scan to download the prescription data electronically and I will ask you about that specifically/separately at the end. For the first part of the interview, I'd like you to just focus on sending prescriptions you send directly to the pharmacy via electronic means such as email or directly from your PMS.

1. To start us off, please can you describe how you are sending prescriptions electronically in your practice (eg via email, direct to pharmacy dispensing software, other method, what software is being used).

How long have you been sending prescriptions electronically directly to the pharmacy?

Are you sending many prescriptions electronically only? (ie direct to the pharmacy without giving the patient a paper copy)

2. Impact of electronic transmission of prescriptions on workflow

How has sending prescriptions electronically affected your workflow?

(eg in consultation, in the wider practice?)

Have you adjusted how you talk about medicines prescribed with your patients when you send a prescription electronically direct to the pharmacy? Please explain...

What are the benefits to your workflow of sending prescriptions electronically direct to the pharmacy?

What challenges have you experienced with your workflow with sending prescriptions electronically direct to the pharmacy?

3. Impact of electronic transmission of prescriptions on interactions with patients

How has sending prescriptions electronically directly to the pharmacy affected your interactions with patients?

Prompts on patient expectations, understanding of the medicines prescribed, improvements,

challenges, particular groups of patients more impacted positively or negatively (eg ethnicity, age).

#### 4. Impact of electronic transmission of prescriptions on communication with pharmacists

How has the shift to sending prescriptions electronically directly to pharmacies affected your communication or relationship(s) with pharmacists?

(eg better/worse/more/less)

What mode of communication do you use most with pharmacists?

What aspects of communicating with pharmacists could be improved?

Now, thinking about NZePS only...

What impact does using the NZePS (ie creating a prescription with an NZePS barcode) have on your workflow?

What are the benefits using the NZePS (ie creating a prescription with an NZePS barcode)?

What challenges have you experienced with the NZePS (ie creating a prescription with an NZePS barcode)?

How has using the NZePS (ie creating a prescription with an NZePS barcode) affected your communication/relationship(s) with pharmacists? Prompts about whether they use the communication tools in NZePS.

How has using the NZePS (ie creating a prescription with an NZePS barcode) affected your interactions/relationship with patients?

## CLOSE OF THE INTERVIEW

Thank participant for their time and provide opportunity to make any other comments that he or she might wish with regard to electronic transmission of prescriptions.

Participants are also given the opportunity to ask any remaining questions they might have about the project.

## SEMI-STRUCTURED INTERVIEW SCHEDULE for community pharmacists

### Introduction TO THE INTERVIEW

Hello, I'm Chloe Campbell, a Senior Research Fellow from the Department of Primary Health Care and General Practice at the University of Otago in Wellington.

Thank-you for your time in participating in this research. [Check have signed consent form]

As mentioned in the information sheet, we are exploring the experiences of general practitioners and pharmacists with electronic transmission of prescriptions. I'll be asking about your experiences and views on how receiving prescriptions electronically affects your workflow, communication between general practitioners and pharmacists, and your interactions with patients.

I'm just going to start with some quick demographic questions...

### DEMOGRAPHICS

Male / Female / Gender diverse

How many years have you been working in community pharmacy?

Number of pharmacists employed in the pharmacy

Number of support staff such as pharmacy technicians

Approximate average number of prescriptions dispensed per day

Practice location: urban, suburban, rural

Co-located with a medical centre?

Dispensary software used

Before I get into the main part of the interview, I just want to clarify what I mean when I say receiving prescriptions electronically.

We are interested in methods such as email or direct into your dispensing software (or some other electronic method I don't know about yet), but not prescriptions you receive to your fax machine or that are handed to you by the patient. This is because fax and patient are the 'traditional' methods, and it is the shift to electronic transmission of prescriptions that we are most interested in.

I do recognise that some prescriptions that are faxed to you or handed to you by a patient will have an NZePS barcode that you will scan to download the prescription data electronically and I will ask you about that specifically/separately at the end. For the first part of the interview, I'd like you to just focus on the prescriptions you are receiving electronically via email, into your dispensing software or other electronic method.

1. To start us off, please can you describe how you are receiving prescriptions electronically in your practice (eg via email, direct to pharmacy dispensing software, other method, software being used, which method most common?)

Are you receiving many prescriptions electronically? (ie transmitted directly from prescriber by email or into your dispensing software)

How is this changing over time?

2. Impact of electronic transmission of prescriptions on workflow

What impact has receiving prescriptions electronically directly from the prescriber had on workflow in the pharmacy? (ie the shift from fax, or hard copy via patient)

What are the benefits on your workflow of receiving prescriptions electronically directly from the prescriber?

What challenges have you experienced on your workflow with receiving prescription electronically (via email or into software)?

3. Impact of electronic transmission of prescriptions on interactions with patients

How has receiving prescriptions electronically directly from the prescriber into your email or dispensing software affected your interactions/relationship with patients?

Prompts on expectations, understanding of what has been prescribed, improvements, challenges, particular ethnic groups more impacted positively or negatively

4. Impact of electronic transmission of prescriptions on communication with GPs

How has receiving prescriptions electronically directly from the prescriber into your email or dispensing software affected your communication/relationship(s) with prescribers?

(eg better/worse/more/less)

What mode of communication do you use most to communicate with GPs? Why?

What aspects of communicating with GPs could be improved?

Now, thinking about when you scan an NZePS barcode to download prescription data...

What impact does scanning NZePS barcodes and downloading prescription data from the NZePS have on dispensary workflow?

What are the benefits that you see of downloading prescription data from the NZePS?

What challenges have you experienced with downloading prescription data from the NZePS?

How has downloading prescription data from the NZePS affected your communication/relationship(s) with prescribers? Prompts about whether they use the communication tools in NZePS.

How has downloading prescription data from the NZePS affected your interactions/relationship with patients?

## CLOSE OF THE INTERVIEW

Thank participant for their time and provide opportunity to make any other comments that he or she might wish with regard to electronic transmission of prescriptions.

Participants are also given the opportunity to ask any remaining questions they might have about the project.