

Primary Sense: a new population health management tool for general practice

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Abstract. Primary Sense is a new data extraction, analysis and reporting tool that the Gold Coast Primary Health Network (GCPHN) has developed to enable practical and effective population health management in general practice and also on a regional level. Once installed, the tool de-identifies data within the practice before running it through various clinical risk algorithms to create practical information that can easily be actioned within the general practice business model in at least two ways. The first is to generate up-to-date reports of patients who are most likely to benefit from specific interventions or occasions of service. The second is to identify potentially serious medication safety issues, alerting clinicians in real time at point of prescribing. Formal live testing of the system was completed in nine practices where 22 managers and nurses and 42 GPs used the tool over a 5-month period in 2019. The live test monitored the use of reports and alerts, and regular feedback from users enabled small but important improvements to the tool. Practice teams successfully used the reports to target specific groups of patients with outstanding care needs or who were at greatest risk of adverse health outcomes. The results of the live test showed that users found Primary Sense to be easy to use and beneficial to general practice. The next phase of this project is now underway to further trial the scalability and change management requirements for full implementation of Primary Sense. As more and more practices adopt the tool, the aggregated data will increasingly help to support population health planning, commissioning of local services, active health surveillance and other related activities.

Additional keywords: evidence-based practice, medication systems, primary health care, point-of-care systems.

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Introduction

We developed the concept of practice-based population health management to assist practices to make better use of their patient data to inform their practice. In practical terms, Primary Sense achieves this in close to real-time by extracting de-identified data, applying algorithms such as Johns Hopkins ACG® and presenting information back to front line general practice staff that supports evidenced-based patient care. During 2019, Primary Sense was tested for a 5-month period in nine general practices, with 22 managers and nurses and 42 GPs.

There are challenges for practices in managing the health of their attending population. These include a fee-for-service funding model that is not optimal for managing chronic disease (Biggs 2016) and the lack of emphasis on the role of general practice in prevention and early intervention (Swerissen *et al.* 2018). The Australian Medical Association (AMA 2017) highlights that GPs are managing more problems in a single consult than they did 10 years ago. To address these challenges, our approach had to fit with, if not improve, the practices' business models and workflows, as well as be easy to use in order to affect health outcomes.

Context: policy or service context

The Institute for Healthcare Improvement describes population health management as the work by healthcare organisations to

improve outcomes for individual patients in order to maximise population health by deploying its resources to meet areas of need within its segmented population (Berwick *et al.* 2008). What those segmented or stratified populations are within Australian general practice has not been defined. However, patients at risk of adverse medication events, especially the elderly, could be considered as one group, with Britt *et al.* (2015) reporting that 11% of patients seeing a GP reported an adverse medication event in the previous 6 months.

The World Health Organization (WHO) has identified patients with chronic diseases as another group of the population at risk of poor outcomes (WHO 2005). Chronic conditions made up approximately three-quarters of the total non-fatal burden of disease in Australia in 2011, with approximately one-third of those potentially preventable (AIHW 2016). The Council of Australian Governments (2012) confirmed that the health system should not simply focus on treating illness, but also on prevention and maintenance of health.

Nationally, the issue of patient safety in general practice is also receiving more focus, with Australia's National Digital Health Strategy (Australian Digital Health Agency 2017) aiming to prevent adverse drug events, decrease medical errors, improve care coordination and support informed treatment decisions by 2022. However, to date, general practice clinical software systems, potentially key to addressing this, remain

unregulated (Gordon *et al.* 2016). Without the ability to segment and highlight populations at risk, improving quality and safety will be a continued challenge for general practice.

More recently, the Commonwealth Department of Health introduced use of a capitated funding model through the Health Care Home trial in general practices across 10 Primary Health Network (PHN) regions to better coordinate care for individual patients with chronic and complex conditions. However, the Royal Australian College of General Practitioners (RACGP; Lyons 2017) reported that the trial was too focused on a capitated funding model for chronic disease, using untested risk allocation software, and for general practices to perform well, it would require advanced management of general practice populations, not just individuals.

As commissioners, PHNs have the goals of increasing the efficiency and effectiveness of medical services for patients, particularly those at risk of poor health outcomes, and improving coordination of care to ensure patients receive the right care in the right place at the right time (Department of Health 2019). Traditionally, PHNs have mainly accessed de-identified aggregated patient data from general practices to demonstrate progress towards these outcomes. However, without timely and accurate de-identified individual-level patient data, PHNs struggle to know if their activity with general practices contributes to improving health outcomes.

The recent evaluation of PHNs stated that PHNs need to reach the less engaged practices, but acknowledged that the practice support model is fairly resource-intensive, suggesting that to increase reach, more scalable strategies such as technology should be explored (Department of Health 2018). Given this context and a lack of further funding to invest in alternative approaches, GCPHN prioritised the development of Primary Sense as a more cost-effective and scalable solution for practice-based population health management and quality and safety improvement in general practice.

Review of literature on similar cases

In Australia, risk stratification generally focuses on identifying those at risk of health deterioration and hospitalisation who may benefit from integrated care interventions (Agency for Clinical Innovation 2015). However, the Advisory Board (2018) stated that focusing on high-risk patients alone is insufficient to achieve population health management, as there needs to also be a focus on those with rising risk. Currently, there is no systematic way for general practice to identify patients with rising risk, or to flag in real-time, medication safety issues at an individual patient level that show that patient's specific results. More generalised medication alerts do exist, but those are known to cause alert fatigue due to over or repeat alerting or rely on a commercial knowledge base (Davies 2018).

The challenges in sourcing accurate, timely, suitable and verifiable data for population health management are well known (Australian Healthcare and Hospitals Association 2015) and evidencing practical benefits of that data to clinical care is problematic (Mehta and Panditb 2018). This becomes especially problematic with general practice data, given the lack of standards to ensure the quality and completeness of data (The King's Fund 2011), and the lack of standards for coding

(Phillips *et al.* 2010a). As a result, this makes the reliability of applying extracted data questionable in a clinical audit.

Buchan *et al.* (2016) noted the implications of incomplete data or inconsistency in coding were that it can create unnecessary variations in care, with Duggan *et al.* (2016) suggesting that this can lead to real patient harm due to patients not receiving the right care. The Australian Commission on Safety and Quality in Health Care (2012) reported that the data used to measure the occurrence of problems in health care is unavailable or unreliable, and patient safety is probably more difficult to assess due to the lack of systematic approaches to identify issues (Phillips *et al.* 2010b).

The Australian Health Services Research Institute reported that there is a need to know which health interventions work in order to assess those that result in little or no health benefit (Sansoni 2016). However, the use of evidence-based information to support GPs' clinical decision-making is limited and finding mechanisms to tailor the evidence to individual patients may increase uptake (Galbraith *et al.* 2017). A population health management approach promotes standardised care and the evidence shows that standardisation in health care results in improved clinical outcomes and reduces risks, inefficiencies and costs (Leotsakos *et al.* 2014).

The case study or practice innovation

The information generated from Primary Sense's innovative real-time data extraction, analysis and reporting tool is available to general practices through a desktop application. The tool uses data from the practice software to quantify the risks of individual patients:

- developing cardiovascular disease
- developing diabetes mellitus
- being hospitalised within the next 12 months (expressed as a percentage).

The Tool also calculates frailty and 'complexity' scores for patient. Frailty uses markers such as falls and weight loss. Complexity is based on how much health resources the patient currently uses, whereas the hospital risk is a predictive calculation.

The information is available as easily actionable reports where the information is re-identified within the general practice. Changes to individual patient data including demographics, risk scores, diagnosis, medications and pathology results are tracked. Reports identify patients with risk factors who are potentially missing interventions, such as pregnant women without vaccinations. The reports include information about attendance to assist practices identify patients who are not attending and may be slipping through the gaps.

Primary Sense also provides real-time medication safety alerts, which are individualised to each patient and do not duplicate those in the practice's clinical software. Alerts are triggered within the GP prescribing workflow and present relevant individualised patient data along with hyperlinks to evidence-based resources.

Primary Sense is programmed to monitor users at the practice and record where they indicate an intention to act upon the report or alert; for example, the medication alert has options for the GP to select from including indicating whether they will take action, what type of action or whether they want to override the alert.

Traditionally, quality improvement in general practice can be labour-intensive, requiring repeatedly applying of filters to data at given intervals. During this time, the patient cohort in question may have changed, which can affect the assessment of improvement. Primary Sense automates this process as much as possible, automatically tracking changes in data, which are available through downloadable reports at predetermined intervals.

Results

User acceptance

One of the main findings from the live testing of Primary Sense was that practice staff required minimal education and training. Most were able to start using Primary Sense almost immediately and intuitively incorporate it into their workflow. GPs liked that the medication alerts appear at the point of prescribing, and for the higher risk scenarios, the message is sent to the GP's inbox for processing the same way as pathology results. Practice managers and nurses liked that the reports show if patients are booked in and highlight opportune activities that could occur during the next visit. The practice staff feedback was that reports were being used to inform clinical meetings and to recall patients based on missing interventions.

Medication alerts

During the test phase, there were a total of 347 medication alerts triggered for 42 GPs. Of these, 128 (37%) were ignored; for 90 (26%), the GP had asked to be reminded next time they repeated the prescription; for 17 (5%), the alert was deemed wrong for the patient (on two occasions the logic needed updating; the algorithm was right the rest of the time); 42 (12%) times the alert was correct and the GP chose to override; and 66 (19%) times the GP said the alert was correct and they would take action. Two GPs ignored 50 alerts, which contributed to 39% of all ignored alerts.

Reports

The downloading of reports was monitored, and changes were seen in subsequent reports. This allows for quality improvement to be monitored and measured in a live manner; it also enables the PHN to see commonly accessed reports and by whom. Twenty-two managers/nurses and 12 GPs downloaded reports during the live test. The reports were downloaded 151 times by managers/nurses and 55 times by GPs. The top three most frequently viewed reports by practice managers/nurses were: the high-risk patient care report, viewed 36 times (24%), which identifies the most complex and co-morbid patients; the practice population profile, viewed 24 times (16%) that risk stratifies the practice's patients; and coordinated care planning report, viewed 17 times (11%), which highlights patients eligible for care plans and reviews. For GPs, the results for the most frequently viewed reports were high-risk patient care, 15 times (27%); practice population profile, seven times (13%); and preventive care, which calculates cardiovascular risk, six times (11%).

Primary Health Network acceptance

From the PHN perspective across the live test practices: of the 23 421 patients processed through ACG®, and using the

complexity scores: 11 007 (47%) of the patients were healthy or low risk; 9602 (41%) had moderate risk; 2107 (9%) had high risk and 702 (3%) had a very high risk of poor health outcomes. The PHN was also able to look at specific diseases in consistent classifications from the ACG®; for example, 5807 patients (25%) had depression; 3418 patients (15%) had persistent asthma; 2151 patients (9%) had diabetes and 617 patients (3%) had Parkinson's disease.

What can be learnt

We learnt that using seamless IT solutions to present and receive timely information, aligned to the workflow, is key to affecting change in general practice in the Australian general practice context. Using patient-specific information, supported by consistent evidence base where possible, made it easy to action in general practice.

Testing and refinement is important to iron out system bugs, but also to continually improve. The program logics needed constant review to ensure the Primary Sense data were as accurate as possible. Inaccuracy was mainly due to variability in how the practices use their clinical software, the various version in use and the data quality and completeness.

We realised the PHN practice support team has a key role in supporting practices to make better use of their clinical software systems if the resulting extracted data are to be used with confidence. It was not until we could see the data at such a granular level that we were able to target areas for improvement, such as prompting practices to record birthweight in the correct field in order for it to be extractable.

Practices preferred some reports over others. Prioritising the highest risk patients for interventions was the most frequently downloaded patient report, which highlighted that practices do not necessarily innately know their most at-risk patients. Many practices were also working with the pregnant women without vaccinations report at the same time, which demonstrated a balanced population health approach.

Conclusion

Gold Coast Primary Health Network successfully concluded the development and initial live testing of Primary Sense, a new Tool that enables population health management in general practice. The unique benefits of Primary Sense are that it is easy for practice staff to use and PHN staff to support, and the current alerts and reports are meaningful and useful for practice staff. Practice staff engagement in the testing process was high, and feedback continues to be positive as Primary Sense is rolled out to more practices.

The next phase is now underway – further trailing towards roll out across the Gold Coast to reach more patients and increase the richness of data to identify area needs at a regional level. This will enhance GCPHN's commissioning intelligence, population health needs assessment, planning and public health surveillance capability.

Conflicts of interest

The authors declare no conflicts of interest.

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