JB MEDICAL
Evidence-based expertise

Xim Limited: Lifelight visual vital signs in primary care

Background

Vital signs include parameters such as heart rate, respiratory rate, blood pressure and oxygen saturation. The measurement and recording of a patient's vital signs are important as they provide the clinician with an indication of the patient's physiological state. They are routinely taken as part of a GP appointment to help GPs ensure that patients receive a timely and accurate diagnosis in Primary Care or via a referral to a specialist. In 2008, GPs made 9.3 million referrals to Secondary Care and their referrals accounted for 21% of total emergency admissions [The King's Fund, 2010].

Primary Care is one of the most effective means of healthcare delivery, especially in the delivery of care to patients with complex comorbidities [Royal College of General Practitioners, 2013]. In England, there are 7,454 GP practices and 35,561 practicing GPs [NHS Digital, 2017]. However, General Practice is under great strain with workload and patient demand at unprecedented levels and continuing to rise. It is estimated that total clinical contacts in General Practice have increased by more than 15% between 2010/11 and 2014/15 [The King's Fund, 2016], with a 13% increase in face-to-face contacts and a 63% increase in telephone contacts.

Time is a major factor in limiting the effectiveness of treatment in Primary Care, which impacts on the delivery of accurate diagnosis, undertaking opportunistic screening, health promotion and prevention and the doctor-patient relationship. A recent King's Fund survey revealed that the average length of GP appointments in the UK is 12.2 minutes (range of 9-15 minutes) [The King's Fund, 2017]. This results in poor levels of GP satisfaction, indeed, 73% of UK GPs said they were somewhat or very dissatisfied with the time spent per patient [BMA, 2017]. Valuable consultation time can be wasted by GPs measuring simple but vital parameters. Having access to these vital signs prior to consultation can greatly help the situation.

GPs are called out for a high number of unnecessary home visits. In 2013-14, it is estimated that 800,000 home visits were conducted by out of hours GPs [National Audit Office, 2014]. The average practice performs 13 care home visits and 27 home visits per week [The King's Fund, 2016]. This comes at a significant cost to the NHS: out of hours GP services in England costs approximately £400m annually, with the estimated average cost per person 2013-14 standing at £7.50 [National Audit Office, 2014]. Unnecessary call outs could be avoided if GPs had access to vital signs when weighing up whether a home visit is needed.

With demands on Primary Care escalating with a 25% increase in workload estimated since 2004 [Salisbury, 2007], alternative strategies have already been adopted to cope with these strains. One such method is telephone triage and telephone consultation. In the short term, telephone triage, by doctor or nurse, seems to reduce GP workload by around 40% [Richards, 2002] and is associated with increased access to care. However there have been some concerns that patient safety may be compromised by these schemes. One study demonstrated a 30% increase in the number of return consultations with a nurse telephone triaging scheme, and a 200% increase in Accident and Emergency (A&E) attendance [Richards, 2002]. Incorporating vital signs parameters into the triage system could make it more accurate, tackling the patient safety issues that some studies have identified.

Proposed technology

Xim have are developing

a vital signs detection system which can estimate heart rate, respiratory rate, oxygen saturation and blood pressure in a non-invasive fashion by using the camera built into a tablet or smart phone.

The technical development in this SBRI project builds upon results of a previous SBRI-funded project. The current project relates to the refinement and adaptation of this technology in a General Practice setting. A key component of this evolution is the development of a data connection with GP computer systems, in order that vital signs measurements can be automatically documented on the patient record. Using the system requires the patient to look at the tablet or smartphone screen for around 30 seconds. It is envisaged that this process could take place prior to the GP or nurse consultation, ideally in the waiting room or at the check-in desk, or during the consultation itself. No specific user input is required to take the readings, nor will the Practice staff have to interact with the tablet/smartphone to allow the record to transfer. This offers the opportunity to integrate the system with existing hardware such as check-in screens or in dedicated new hardware in waiting room booths.

The company envisage a number of specific benefits for this system, including:

- Reduced time within the consultation.
- Elimination of spurious blood pressure readings, reflecting white coat hypertension.
- Screening for unsuspected hypertension or heart rhythm abnormalities.
- Remote triage of patients requesting home visits via integration of the system with smartphone technology.
- Reduction of patients attending A&E when unable to access GP appointments.

Looking further forward, extending into remote triage with NHS111 could be a future development.

Market access

It is anticipated that the cost to supply Lifelight to an individual practice will be around £5,000. For a typical Clinical Commissioning Group (CCG) with around 30-40 practices this would equate £150,000 to £200,000 per year. The company are in discussion towards a partnership agreement with a leading EHR supplier who currently supply software support to around one-half of the GP Practices in England. Distribution would be through the partner's existing contracts with CCGs, via the GPSoC Framework. They have already had early expressions of interest from three CCGs, two providers of NHS111 services and one Ambulance Trust.

It is possible that individual GP practices may choose to fund the devices directly, if they believe that the time saved will offset sufficient GP locum/practice nurse time to make this an economically viable investment. We would suggest that this element is documented in the clinical evaluation of the new device, as it may provide a potent alternative driver for adoption.

Health economics

There are two routes by which the financial impact of the monitoring device can be assessed – workload cost reductions and the effect on better identification of cardiovascular risk.

Workload impact

In the UK, the annual consultation rate for GPs is 3.49/head of population and for practice nurses is 1.06 [Curry]

For a typical practice serving a population of 8,000, this will amount to 27,920 GP consultations and 8,480 Practice nurse consultation

The average duration of a GP consultation varies according to the source used – estimates range from 9.2 minutes to 12.2 minutes [PSSRU, Kings Fund]. Practice nurse consultation is typically a little longer – typically around 15 minutes [PSSRU]

Measurement of vital signs will not be relevant in all consultations – if we assume that it will be carried out in 30% of consultations and will take 2 minutes in each case, the average time spent per practice per year will be:

- 27,920 x 30% x 2/60 = 279 hours of GP time per year (0.15 FTE)
- 8,480 x 30% x 2/60 = 85 hours of nurse time per year (0.05 FTE)

Based on £34 per hour for nurse patient contact time and £215 per hour for GP patient contact time, the attributable cost to vital signs measurement will be £62,861 per year.

If we assume that use of the Xim device reduces the time required to 30 seconds (to view and interpret the results), we can estimate potential savings of £47,146. After deduction of the £5,000 fee for the system, this yields a net saving of around £42,000 per practice per year

If multiplied up to the whole UK, this represents a potential net annual saving of around £331 million

In terms of realising these savings, the nurse time is directly funded by the practice so it is not difficult to monetise this saving (although the absolute amount per practice is small in this example). GP time savings are traditionally considered notional, as thanks to the contractual basis on which primary care is funded, a reduction in time spent cannot be converted into a cash saving at CCG level. However, from the practice's perspective this is not the case. As many practices depend on the support of locums and sessional doctors, the reduction in GP time can be directly translated into a benefit for the practice.

This type of saving can be used to generate a business case for practices to adopt and fund the system themselves. The more persuasive argument for CCGs to fund this system will be the gains consequent on better identification of those at risk of cardiovascular events. We have considered below one specific example of this – the identification of and management of unsuspected hypertension.

Hypertension

The identification and appropriate management of hypertension is of established cost effectiveness and its effective treatment is built in to the QoF payments system for general practice. We do not, therefore, need to separately establish that this is a cost effective intervention per se. What is required is to show that the use of the Xim device is likely to result in a higher proportion of eligible patients being identified than is the case with current strategies:

- Antihypertensive medication is indicated in patients who have a sustained blood pressure of >140/90 mmHg in the presence of end-organ damage or a calculated CV risk of >2% per year.
- If we assume that the mean CV event rate in the identified patient group is 2.5% per year and the institution of effective blood pressure lowering will reduce this risk by 25%, then we can expect to prevent 1 event per year for every 160 patients treated.
- Based on the use of two agents in most patients, drug costs will be ~£2 per patient per month, equating to £3,840 spent per event prevented.
- Estimates of the direct healthcare costs for the management of stroke vary widely depending on the source consulted, but typically range between £10,000 - £20,000
- Expenditure of £3,840 to prevent an event costing ~£15,000 is consequently a clear cost benefit – with a net annual gain of £69.75 per patient treated.
- If we assume that the cost of using the Xim system is £5000 per practice per year, in a typical CCG with 35 general practices, this would require annual expenditure of £175,000 per year.
- In order to recoup the cost, the CCG would need to prevent 15.7 strokes per year (175,000/[£15,000 - £3,840]).
- To yield this level of stroke prevention, the CCG would need to identify and treat 2,512 patients with an elevated blood pressure (and CVD risk >2%).
- Assuming there is a 250,000 population within the CCG, this represents a detection rate of around 1% - or ~72 patients per general practice.
- Health Survey for England identified that around 40-45% of the population aged 16-plus had a blood pressure >140/90 mmHg. If we assume that 25% of these have a CV risk of >2% per year, this will amount to around 800 patients per practice.
- Xim therefore will have to demonstrate that the ease of use of their device allows an extra 10% of these missing 800 patients to be diagnosed and treated, in order to be cost effective in its own right, regardless of any other benefits. This does not seem too high a hurdle to achieve.

Of course, the BP benefits should not be considered in isolation. In a formal economic model one would take into account detailed population profiles, incorporating patients with multiple identifiable risk factors, and a full range of preventable outcomes. One would also combine the staff time benefits with the clinical outcomes, in order to paint a compelling scenario.

Conclusions

Xim have taken their prototype technology and are developing a solution that could be integrated into general practice. By substantially reducing the time taken to measure and document vital signs measurements, the system could offer substantial workforce savings. After taking into account the cost of the system, we estimate that savings of £331 million are potentially deliverable across the whole of the UK. In addition to this, earlier and more comprehensive identification of patients with an elevated cardiovascular risk offers the opportunity to make further savings, predicated on the prevention of cardiovascular events. By limited modelling based on preventing stroke through identification of hypertension, we have shown that this clinical benefit could substantially add to the potential savings. Provided that a deliverable market access strategy can be developed, this technology has the potential to be highly cost effective to the NHS.

References

British Medical Association. Analysis of Patient GP Survey, 2017. Available at https://www.bma.org.uk/-/media/files/pdfs/collective%20voice/policy%20research/public%20and%20population%20health/gp-patient-survey-briefing-2017.pdf?la=en

Curry N (2015) 'Fact or fiction? Demand for GP appointments is driving the 'crisis' in general practice'. Nuffield Trust comment, 3 March 2015. https://www.nuffieldtrust.org.uk/news-item/fact-or-fiction-demand-for-gp-appointments-is-driving-the-crisis-in-general-practice

National Audit Office. Out-of-hours GP services in England, 2014. Available at https://www.nao.org.uk/wp-content/uploads/2014/09/Out-of-hours-GP-services-in-England1.pdf

NHS Digital, General and Personal Medical Services, England High-Level March 2017, Provisional Experimental Statistics. Available at https://digital.nhs.uk/media/30969/General-and-Personal-Medical-Services-England-March-2017-Report-Provisional-Experimental-statistics-/Any/nhs-staf-mar-2017-prov-gene-prac-rep

PSSRU. Unit Costs of Health and Social Care 2016. http://www.pssru.ac.uk/project-pages/unit-costs/2016/index.php

Richards DA et al. Nurse telephone triage for same day appointments in general practice: Multiple interrupted time series trial of effect on workload and costs. BMJ, 2002. 325:1214–1217. doi: 10.1136/bmj.325.7374.1214.

Royal College of General Practitioners. The 2022 GP Compendium of Evidence, 2013. Available at https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjUh5zLrYHWAhVDY1AKHTE5CYQQFggmMAA&url=http%3A%2F%2Fwww.rcgp.org.uk%2F~%2Fmedia%2FFiles%2FPolicy%2FA-Z-policy%2FThe-2022-GP-Compendium-of-Evidence.ashx&usg=AFQjCNG5GiI1j_tiWJyLsvl5XQrj6Rpenw

Salisbury C et al. Impact of Advanced Access on access, workload, and continuity: controlled before-and-after and simulated-patient study. Br J Gen Pract. 2007;57:608–614.

The King's Fund. Understanding pressures in general practice, 2016. Available at http://cdn.basw.co.uk/upload/basw_53043-7.pdf