

Evaluation of a 'drop box' doorstep assessment service to aid remote assessments for COVID-19 in General Practice

Word Count: 3979

Search terms: 'General Practice', 'Family Medicine' 'COVID-19' 'infectious disease' 'quality improvement'

Dr Greg Irving MA MSc MPH PhD FAcadMed FRCGP

Academic GP

GP Garwood Surgery, Billinge Rd, Garswood, Wigan, Lancashire, UK, WN4 0XD

Phone 01744 621670 Fax 01942 713432 Mobile 07745148864

Greg.Irving2@sthelens.nhs.uk

Competing Interests -None

Dr David Lawson MB ChB MRCP

GP Garswood Surgery Billinge Rd, Garswood, Wigan, Lancashire, UK, WN4 0XD

Phone 01744 621670 Fax 01942 713432

David.Lawson@sthk.nhs.uk

Competing Interests- None

Dr Adele Tinsley BSc Hons MBBS MRCP

GP Central Surgery Lowe House Healthcare Resource Centre, 103 Crab Street, St Helens, Merseyside, UK, WA10 2DJ

Phone 01744 627660

Sessional GP St Helens Rota

Adele.Tinsley@sthelensccg.nhs.uk

Competing Interests -None

Dr Helen Parr MB ChB MRCGP DFFP

GP Garswood Surgery Billinge Rd, Garswood, Wigan, Lancashire, UK, WN4 0XD

Phone 01744 621670 Fax 01942 713432

Helen.Parr@sthk.nhs.uk

Competing Interests -None

Ms Cheryl Whittaker BA Hons

Operations Manager St Helens Rota, Albion Street, St Helens, Merseyside, UK, WA10 2HA

Phone 01744 673801 Fax 01744 673804

Cheryl.Whittaker2@hsthpcct.nhs.uk

Competing Interests –None

Ms Haley Jones BSc Hons

Medical Student University of Liverpool, Department of Medicine, Cedar House, Ashton Street,
Liverpool, UK, L69 3GE

Phone 0151 795 4362

Hayley.Jones5@sthelensccg.nhs.uk

Competing Interests –None

Prof. Stephen J Cox MB ChB DGM FRCGP

Visiting Professor, University of Chester Chair, Mersey Faculty RCGP

Executive Partner, Spinney Group

The Spinney Medical Centre, Whittle Street, St Helens, Merseyside, UK, WA10 3EB

Phone 01744 758999 Fax 01744 758322

Steve.Cox@sthelensccg.nhs.uk

Abstract

The Novel coronavirus disease 2019 (COVID-19) is an established threat whose clinical features and epidemiology continues to evolve. In an effort to contain the disease the NHS has adopted a digital first approach in UK General Practice resulting in a significant shift away from face-to-face consultations. Consequently more consultations are being completed without obtaining objective recording of vital signs and face-to-face examination. Some regions have formed hot hubs to facilitate the review of suspected COVID-19 cases and keep their practice site 'clean' including the use of doorstep observations in avoiding the risk of face-to-face examination. To support the safe, effective and efficient remote assessment of suspected and confirmed COVID-19 patients we established a doorstep assessment service to compliment telephone and video consultations. This allows physiological parameters such as temperature, pulse, blood pressure and oxygen saturation to be obtained to guide further triage. Quality improvement methods were used to integrate and optimize the door-step assessment and measure the improvements made. The introduction of a doorstep assessment service increased the proportion of assessments for patients with suspected COVID-19 in routine care over weeks. At the same time we were able to dramatically reduce face-to-face assessment over a six week period by optimising through a range of measures including the introduction of a digital stethoscope. The majority of patients were managed by their own General Practitioner following assessment supporting continuity of care. There were no adverse events during the period of observation; no staff absences related to COVID-19. Quality improvement methods have facilitated the successful integration of door-step assessments into clinical care.

Problem

The novel coronavirus disease 2019 (COVID-19) is an established health care threat whose epidemiology continues to evolve. [1] In an effort to contain the disease the NHS has adopted a digital first approach in UK General Practice resulting in a significant shift away from traditional face-to-face consultations. [2] In response to the pandemic General Practitioners (GPs) have moved to a total triage model following NHS England guidelines. [2] Using online, telephone and video consultations to reduce avoidable footfall in practice and protect patients and staff from infection. [3] Consequently more consultations are being completed without obtaining objective recording of vital signs and face-to-face examination.[4] Some regions have formed hot hubs to facilitate the review of suspected COVID-19 cases and keep their practice site 'clean' including the use of doorstep observations in avoiding the risk of traditional face-to-face examination. [5]

Prior to the 20/4/20 there were 152 confirmed cases of COVID-19 for 34 practices in St.Helens covering a population of ~192,000. A retrospective case audit of 4831 patients in a single surgery in the same population prior to 22/4/20 identified 21 patients with suspected COVID-19 (0.4% of population). Whilst all of these patients had a remote assessment only two had a physical assessment (10%) and both of these were done in an urgent care setting; none (0%) were done in routine care. Two of the suspected COVID-19 patients went to hospital without prior examination in primary care (10%). There was one death with COVID-19 on the certificate in one of the hospitalised patients. A GP provider group of 26 practices in the St. Helens area covering a total population of 140,957 patients setup a local hot hub following discussions about local service needs in response to the COVID-19 pandemic. The Hub was staffed by participant practice GPs and Advanced Nurse Practitioners (ANPs) who have volunteered and meet 'lower infection risk' assessment. The aim of the service was to allow community assessment of those patients with suspected COVID 19 infection who are not able to attend the Hot Clinic whilst minimising exposure to primary care workforce and community spread. The service was commenced on 22/4/20 and planned to run until 30/6/20 with the door-step assessment introduced on 27/4/20; this was in anticipation of the peak of COVID-19 in early May, ~ 2 weeks behind that in London. A retrospective case review of patients reviewed at the hot hub in the week prior to the introduction of the doorstep assessment service indicated that all patients (4) were receiving traditional face-to-face assessment in full PPE.

The SMART objectives assessed in this study include 1) Increase the proportion of assessments of vital signs for patients with suspected COVID-19 in routine care by 10% in two months (baseline 0%) 2) Increase the proportion of non-face-to-face assessments for suspected COVID-19 patients at the hot hub by 10% in two months (baseline 0%). Other outcomes to be reported includes 3) Number of doorstep assessments in patients with suspected COVID-19 4) Absences from work due to COVID-19 amongst clinicians 5) Hospitalisations of clinicians from COVID-19 6) Hospital admissions from doorstep-assessment service 7) Number of deaths within four weeks of using the doorstep assessment service and 8) Number of adverse event and serious adverse events within the doorstep assessment service.

Background

Novel coronavirus disease 2019 (COVID-19) is an established threat whose clinical and epidemiological characteristics continue to evolve. [1] In an effort to contain the disease the NHS has recommended that remote consultations should be used when possible resulting in a significant shift away from in person traditional face-to-face consultation. [2] To support the safe, effective and efficient assessment of suspected and confirmed COVID patients we established a doorstep assessment service to compliment telephone and video consultations. This allows physiological parameters such as pulse, and temperature and oxygen saturation to be obtained to support further triage.

What existing evidence is there that this problem exists?

COVID-19 is a significant cause of morbidity and mortality globally with the UK having amongst the highest mortality rate in the world. [6] Notably health professionals are at increased risk of contracting COVID-19.[7] Suspected COVID-19 patients who need face-to-face examination beyond telephone or video consultation are typically assessed in either the GP surgery, the patient's home, the local hot hub or admitted directly to hospital. There have also been a number of significant events related to a failure to assess physiological parameters which has resulted in avoidable deaths in COVID-19 patients not least failures to identify silent hypoxia. To complicate the situation further full personal protective equipment in primary care has been in short supply and there is a widespread concern about personal safety. [8] Even with the availability of PPE, risk assessments meant that some clinicians were unable to conduct face-to-face assessments. [9]

What evidence is there that other people have tried to solve this problem in the past?

Novel smart phone apps such as LifeLight® that attempt to measure blood pressure, pulse respiratory rate, pulse oximetry without making physical contact with the patient have not as yet been validated to the standard required for accurate and safe assessment in acute primary care.[10] On demand home based self-guided examination devices are commercially available. Devices such as Tytohome® are designed for mobile capture and transmission of ear, throat and skin images, heart and lung auscultation, and temperature but not blood pressure and oxygen saturation.[11] The current retail cost of each device is ~£236. The device is FDA approved and have been evaluated in feasibility studies in clinically stable patients in the USA. There are no published reports that they have been used in COVID-19 and no data relating to their use in elderly patients. Remote assessment of patients with stable chronic disease using kiosks has also been reported. These are often placed in strategic locations in the community and clinical setting to provide remote access to a diagnostic assessment but are not suitable for doorstep assessment. During the current pandemic other clinical commissioning groups have established an oxygen saturation probe monitor drop and collect service but as yet no data has been published. [5] Equality and diversity issues have been reported in relation to the use of some technology used in remote assessment especially those that require the use and operations of a mobile phone.

Is there any evidence for what works and what doesn't to solve your problem?

The equipment proposed for use in our doorstep assessment has been extensively researched and approved by the MHRA. As COVID-19 is an emerging disease evidence of what works in terms of assessment remains limited. NEWS2 includes blood pressure measurement and oxygen saturation although use has been suggested without the need for BP if measurement does not alter management. There is no high quality research on the value of NEWS2 outside of the hospital setting. If used it should be done so alongside wider clinical assessment of the patient and in the context of changes over time. For the rapid diagnosis of suspected pneumonia in COVID-19 temperature, pulse oximetry, respiratory rate and heart rate are required. Blood pressure and auscultation should be reserved for situations where it will help to alter management when clinically indicated.

Measurement

Initial data collection focused on the number of assessments at the hot hub clinic during a single working week prior to the implementation of the doorstep assessment service to get a 'snap shot' of the problem. A retrospective case analysis was undertaken to identify the number of appointments that were available, how many traditional face-to-face appointments were being undertaken along with how much PPE was being used. In order to meet our project aim we used the electronic medical record to measure the number of appointments available for both the doorstep assessment and hot hub clinic, the number of face-to-face assessments undertaken in both the doorstep assessment service and hot hub. Hospital admissions and deaths were also measured as secondary outcomes as they formed part of routine data collection. The cost of the service was also quantified.

Design

The doorstep assessment service was established alongside the implementation of a COVID-19 hot hub by St Helens Clinical Commissioning Group (CCG). The quality improvement team included the local COVID-19 lead for primary care (SC), Primary Care Network lead (DL), HCAs (DS), Hot hub practice manager (CW) and local GPs (AT, GI, CF). The aim of the service was to allow community assessment of those patients with suspected COVID 19 infection whilst minimising exposure to primary care workforce and community spread. If needed patient could be referred on for further assessment at the Hot Clinic, admitted to A+E or managed by their own GP. A Standard Operating Procedure (Appendices 1-8) was developed based on the application of principles of COVID-19 risk reduction for NHS staff – elimination if possible by minimising traditional face-to-face contact, hygiene measures and safe systems of work with election of correct use of PPE when needed. (Appendices 9-11) [7] Children were not included in the service. We followed the best available evidence emerging from the literature for how clinical assessment of suspected and confirmed COVID-19 patients should be assessed; action points from regional significant event reports relating to need for physical assessment to take place where needed; epidemiological data identifying high risk populations; equality and diversity considerations including a need to provide care for shielded patients. We engaged with stakeholders in the development of the service through a weekly series of remote meetings. We refined our protocol by simulating assessments. A pre-mortem analysis of the proposed service was undertaken to anticipate potential problems – lack of guidance and training on how to undertake an assessment; technology failure; infection control issues and equality and diversity issues.

Suitable inclusion criteria include those patient with symptoms consistent with COVID-19 when a clinician in general practice has completed a telephone/video assessment and feels obtaining a NEWS2 score and more specifically an oxygen saturation would change management (Appendices 1-5). Notably this included housebound patients or patients without own transport. In addition clinicians at the hot hub who would potentially be undertaking face-to-face assessment on referred patients were also able to re-triage patients referred for traditional face-to-face assessment to the doorstep assessment service if needed. Two forms of door step assessment review available 1) an assessment review for observations only undertaken by the patient themselves with support of a visiting HCA if needed or 2) a diagnostic review undertaken by a GP via video link with full vital signs (Figure 1).The assessment involved delivering the assessment at the earliest opportunity and within the timeframe of the review request. The equipment required to undertake the assessment is listed in table 1.

[Insert figure 1]

Equipment
Pulse oximeter
Digital thermometer
Sphygmomanometer with disposable cuff
Tablet with wifi
Digital stethoscope (PDSA 3 only)

Table 1: Doorstep assessment dropbox equipment

The implementation team met remotely about every four weeks during the service. Providers and staff were educated about the service and questions about clinical flow were answered. New providers and staff when orientated from doorstep assessment champions, were provided with an induction manual and were included in meetings were appropriate.

To ensure the sustainability of the service we aimed to empower front line staff and service users. Using data to drive improvement measuring the impact of the service over time – trying to understand variation in process and outcomes. We planned for the service to be scaled up and extended post –COVID-19 with adaption to local needs, new environments, patient and staff groups by making use of currently available equipment and resources and becoming the new way of operating.

Strategy

In our first PDSA cycle we decided to implement the assessment service for patients with suspected COVID-19 patients carried out by Health Care Assistants (HCAs). This was done to find out the impact of running the service during a busy time for the local primary service during the pandemic. After discussions with the participating practices and St.Helens CCG doorstep assessment result could also be entered directly into the patient's notes using Egton Medical Information System (EMIS) Enterprise. This PDSA cycle was done primarily to test feasibility of the service for patients. Informal feedback from staff, providers and patients were mostly positive and was used to inform our second cycle. Only 15% of patients using the service were male. The mean age of patient mean age of patients was 54 (range 21-83). A small number of referrals received were not appropriate for the service.

For PDSA cycle 2 we enabled referrals to be made directly through EMIS using the existing extended access appointment booking service. We introduced an online template for clinicians to follow when making a booking to ensure the referral received were appropriate. We shared emerging UK observational data for risk of death and shared performance data to date – encouraging GP surgeries to have a low threshold for referring individuals at high risk of death. We tailored the service to align with local and national PHE recommendations on shielding and testing. For PDSA cycle 3 we assigned hot hub champions to help maintain continuity and share experience within the service. A digital stethoscope (Thinklabs®) was made available to clinicians at the hot hub. One of the GP assistants was trained to set this up for clinicians to use.

Result

The main outcomes for the study were change in the proportion of assessments of vital signs for patients with suspected COVID-19 in routine care and change in the proportion of non-face-to-face assessments for suspected COVID-19 patients at the hot hub. At baseline all patients were being assessed through traditional face-to-face assessment at the hot hub. After PDSA 1 with the introduction of the doorstep assessment 27% of patients had non face-to-face assessments. This increased to 28% after PDSA cycle 2 and 100% after PDSA cycle 3 (figure 2)

[Insert figure 2]

On one day when the doorstep assessment service was not available the proportion of traditional face-to-face assessments reverted back to 100%. At baseline there was no doorstep assessment service available and therefore no extra physical assessment made. After PDSA 1 with the introduction of the doorstep assessment 27% (20) of patients had non face-to-face assessments. This increased to 28% (23) after PDSA cycle 2 and 100% (43) after PDSA cycle 3 (figure 3).

[Insert figure 3]

The total number of doorstep assessments carried out over the three two week cycles was 61 (PDSA 1 = 20, PDSA 2 = 23, and PDSA 3 = 18) (figure 2). There were 5 (8%) hospital admissions to hospital from the doorstep assessment service – in one case an ambulance was called prior to the arrival of the GP assistant. Four of these patients referred from the doorstep assessment went on to have COVID 19 (mean duration of admission 5 days, range 1-12). This compares with 7 admissions (5%) from the 138 patients reviewed at the hot hub over the same time period (figure 4). Five of the patient referred from the hot hub patient went on to have a diagnosis of COVID 19 (mean duration of admission 5 days, range 1-13). (figure 4). All remaining assessments 56 (92%) were followed up by the patient's usual GP. Three patients had a follow-up doorstep assessment. No patient who underwent a door step assessment went on to have an assessment in the hot hub or vice versa. There were no patient deaths within four weeks of using the doorstep assessment service. There were no adverse events or significant adverse events associated with the doorstep assessment service. Data from one of the referring GP surgeries (list size 4831 patients) during the period of the project reported 11 cases of suspected COVID 19. Of these 7 were referred for the door step assessment service and 1 to the hot hub. Three patient did not have any further assessment (mean

age 34). For these three patient assessment beyond video consultation was not considered necessary by the GP. All three patients made a full recovery. All patients with frailty were reviewed through the doorstep assessment service. There were no clinical staff absences with suspect COVID-19 and no clinicians were hospitalised with COVID-19. The mean age of patients assessed with the doorstep assessment was 56 (range 21-84), 26% were male. The cost of running the service using the GP assistant was £520 per week. The cost of the dropbox was £50 for the basic box (oxygen saturation monitor £25, blood pressure machine £25), £100 with a tablet included (Amazon Fire £60) and £507 with a digital stethoscope (Thinklab® stethoscope £397).

[Insert figure 4]

Lessons and limitations

The project aim was to try aim was to increase the proportion of assessments of vital signs for patients with suspected COVID-19 at the same time as increase the proportion of non-face-to-face assessments for these patients which was achieved. Trying to improve the quality of the doorstep assessment service during the COVID-19 pandemic was challenging given the evolving nature of the pandemic, changing public health measures, the emergence and evolution of new evidence and guidelines during the pandemic. Establishing PDSA cycles and regularly communicating back to hub was vital given the changing situation so that the service could adjust and adapt. Given the co-operative nature in which the service was run there was a relatively high turnover of clinicians running the hot hub service which made establishing and maintaining expertise within the service challenging in terms of maintaining institutional knowledge and expertise. In contrast we were fortunate to have a small number of GP assistants (3) running the doorstep assessment service.

Evaluating data from the service within the PDSA cycles was useful in that it allowed us to identify that service was not necessarily being utilized in patients at the highest risk of death e.g. male, elderly, obese.[12] The typical GP surgery in St.Helens has approximately a ~38% male population. Coupled with this the proportion of males contacting their GP with suspected COVID symptoms appears to be lower than in females. There is also a long history of late presentations with other illnesses such a cancer and cardiovascular disease in male population in the region. We hypothesise that male patients are presenting late with more severe symptoms hence going directly to secondary care have included the text below in the discussion. It also highlights the potential for inequality when introducing such a service and that the inverse care law may be in operation.[13]

Establishing a baseline during the pandemic was difficult given the changing epidemiology of the disease and the reconfiguration of local services. The baseline measurement period was relatively short due to 1) patient and practitioner safety concerns along with 2) local and national concerns regarding the availability of effective PPE 3) increasing patient demand. The target of a 10% increase in the proportion of patients with vital signs assessment and the 10% increase in non-face-to-face assessments was arbitrary and should we conduct the project again would recommend a much higher target of 50 – 100% as we found it at least theoretically possible for all assessments to be conducted non-face-to-face. The study was conducted during the first lock down and the number of patients presenting to local GPs with suspected COVID symptoms was falling in PDSA cycle 3 and as a result the number of physical observations remained static. Future research under experimental conditions would help to evaluate the safety and effectiveness of doorstep assessments.

The changes made in PDSA 2 resulted in a marginal improvement in reducing the proportion of traditional face-to-face contacts with PPE. In contrast the introduction of the digital stethoscope in PDSA 3 resulted in a step change which eliminated traditional direct face-to-face contact. Training one of the GP assistants to set up the stethoscope for clinicians reduced the anxiety of using a new device. The lack of utilisation of the remote video consultation service was surprising given the attention this has received nationally. Some clinicians felt this was ‘not needed’ and ‘added little to assessment over the phone’. A number of regions have established a hot hub service but to our knowledge relatively few have introduced a doorstep assessment service. We anticipate that our findings may be useful should a second wave of COVID-19 or future pandemic occur. We reflected on the scalability of the intervention using the ISAT (Intervention Scalability Assessment Tool) identified workforce provision as a key challenge (14). We achieved this during the project through a high level of cooperation between local GP providers but we are now looking to make this more sustainable by linking this workforce provision with the roll out of NHS virtual wards. Evaluating the service through a quality improvement project has helped to facilitate local discussions on how urgent care could be better co-ordinated following the COVID-19 pandemic given that a number of the findings and service changes were felt to be generalisable to the existing and emerging urgent care and chronic disease services; indeed the doorstep assessment service has recently been adopted locally by the community nursing team to assist with chronic disease management.

Conclusions

To our knowledge this is the first quality improvement project completed during the COVID-19 pandemic. The doorstep assessment service was able to increase the proportion of assessment completed for patients with suspected COVID-19 whilst at the same time reducing the number of traditional face-to face assessments required and preserving PPE equipment. The majority of patients undergoing a doorstep assessments are followed up by their own GP maintaining continuity of care rather than leading to admission to hospital. Further evaluation of doorstep assessment services under experimental conditions would help to establish their utility beyond the COVID-19 pandemic and whether their use should be scaled up and spread in urgent care and different settings e.g. care homes, work places and local communities.

Contributor Statements

Conception or design of the work -GI, DL, AT, SC, HP, Data Collection -GI, AT, HJ, Data Analysis and Interpretation -GI, DL, AT, SC, Drafting the article -GI, DL, AT, HJ, CW, SC, Critical Revision of the Final Article -GI, DL, AT, HJ, CW, SC, Final Approval of the version to be published -GI, DL, AT, HJ, CW, SC, HP

Funding

This study was not externally funded

Acknowledgement

We would like to thank St. Helens GP provider group and St.Helens CCG and the RCGP for their support on this project.

References

- 1 Greenhalgh T, Koh GCH, Car J. Covid-19: A remote assessment in primary care. *BMJ* 2020;**368**. doi:10.1136/bmj.m1182
- 2 Coronavirus Standard Operating Procedures.
<https://www.england.nhs.uk/coronavirus/primary-care/general-practice/standard-operating->

- procedures/ (accessed 15 May 2020).
- 3 RCGP RSC Workload Observatory. <https://clininf.eu/index.php/rcgprscworkloadobservatory/> (accessed 3 Jun 2020).
 - 4 COVID-19: Patient Assessment the role of physiology and oximetry - AHSN NENC AHSN NENC. <https://www.ahsn-nenc.org.uk/covid-19-patient-assessment-the-role-of-physiology-and-oximetry/> (accessed 3 Jun 2020).
 - 5 Barnet Primary Care Pathway. [https://www.pcrs-uk.org/sites/pcrs-uk.org/files/resources/COVID19/Barnet-Primary-Care-Pathway-during-Covid19 v1.0.pdf](https://www.pcrs-uk.org/sites/pcrs-uk.org/files/resources/COVID19/Barnet-Primary-Care-Pathway-during-Covid19%20v1.0.pdf) (accessed 15 May 2020).
 - 6 WHO Coronavirus Disease (COVID-19) Dashboard. <https://covid19.who.int/> (accessed 10 Jun 2020).
 - 7 COVID-19 Update: Risk Reduction Framework for NHS staff at risk of COVID-19 infection news. <https://www.fom.ac.uk/covid-19/update-risk-reduction-framework-for-nhs-staff-at-risk-of-covid-19-infection> (accessed 10 Jun 2020).
 - 8 Robinson F. Self-protection: how NHS doctors are sourcing their own PPE. *BMJ*. 2020;**369**:m1834. doi:10.1136/bmj.m1834
 - 9 Risk assessments for staff - NHS Employers. <https://www.nhsemployers.org/covid19/health-safety-and-wellbeing/risk-assessments-for-staff> (accessed 11 Jun 2020).
 - 10 Lifelight First for monitoring vital signs | Advice | NICE. (accessed 15 May 2020).
 - 11 TytoCare | On Demand Medical Exams. Anytime. Anywhere. <https://www.tytocare.com/> (accessed 15 May 2020).
 - 12 Williamson E, Walker AJ, Bhaskaran KJ, *et al*. OpenSAFELY: factors associated with COVID-19-related hospital death in the linked electronic health records of 17 million adult NHS patients. *medRxiv* 2020;:2020.05.06.20092999. doi:10.1101/2020.05.06.20092999
 - 13 Tudor Hart J. The Inverse Care Law. *Lancet* 1971;**297**:405–12. doi:10.1016/S0140-6736(71)92410-X

Figures

Figure 1: Doorstep assessment care pathway

Figure 2: Proportion of non-face-to-face assessments

Figure 3: Number of physical assessments over time

Figure 4. Patient flow through the hot hub and doorstep assessment service