Expanding the doctor's toolkit:

An independent study using remote respiratory clinical examination equipment.

Dr. Hasib Ur-Rub, Bromley GP Alliance 24th-25th September 2021 | Primary Care Respiratory Society Conference



Background

The current COVID-19 pandemic has brought a successful shift towards the delivery of remote consultations. Telemedicine platforms which provide self-monitoring tools were associated with improved patient knowledge, reduced outpatient hospital visits and reduced hospital admissions. These innovative tools empower self-management by patients, thus improving treatment adherence (1).

There are nuances to telemedicine consultations. Non-verbal cues (facial expressions, body language, severity of illness and patient frailty) have always been crucial in building a good doctor-patient relationship. With telephone only consultations (TC), both parties are deprived of these cues and therefore need to rely on advanced verbal skills to avoid making judgment errors. Clinicians and patients have expressed concerns about making inaccurate diagnoses with TC, having increased rates of antibiotic prescriptions and increased need for sign posting to emergency services.

In potential solutions, some have adapted specific questioning methods and instructions for patients to self-examine to elicit important clinical information (i.e. e-consultations). The more advanced video consultation (VC) platforms with remote examination (either video otoscopes, electronic stethoscopes or dermatoscopes) bridge the gap between remote consultations and face-to-face (F2F) contact, allowing the use of non-verbal cues and physical examination. These systems can maximise consultation efficiency and improve patient satisfaction (2).

The benefits of using remote examination technology can include:

• Improved access to care for patients Collaborative working to promote safety and infection control measures



Arc Health platform (Picture 1) integrates built-in physical examination tools with live video consultations. It is equipped with an integrated stethoscope, blood pressure monitor, pulse oximeter, thermometer and close examination high-definition camera. The technology allows patients, carers or parents to perform a full self-examination remotely during a video consultation with their doctor.

- The potential reduction in antibiotics stewardship and prescribing for respiratory and ENT complaints
- More effective GP workloads

A shift from remote consultations to remote examinations is needed.

Aim

An independent study was conducted by Bromley GP Alliance comparing the use of the Arc Health station digital stethoscope for respiratory complaints vs. conventional F2F clinician examination; particularly focusing on the stethoscope in their dedicated respiratory hub.

The main aims of the study included:

- Demonstrating the efficacy of using the Arc digital stethoscope
- Evaluating any disparities between clinical findings using the Arc Health station vs. F2F examination



Station equipment: 1. Blood pressure monitor 2. Thermometer 3. Pulse oximeter 4. Medi-camera for ENT and skin examination 5. Stethoscope

Picture 1-A representation of the remote examination technology Arc Health with its components

Method

Seven GPs examined a total of 86 patients with respiratory symptoms. During each consultation a patient's chest was remotely examined using the Arc Health station and then examined F2F by the same GP for a direct comparison of respiratory clinical findings.

The main clinical findings analysed for each patient were positive

Findings

For each of the patients, clinical outcomes for all three clinical findings and no findings were similar between F2F and Arc Health (Figure 1). An exact McNemar's test determined no statistically significant difference in the proportion of positive or negative findings using either Arc or F2F, p = 1.0; allowing acceptance of the null hypothesis that there would be no difference between F2F vs. Arc examination findings.

On auscultation, positive unique signs (not substantiated by F2F) were found in only 3% of Arc examinations, and importantly, no significant clinical chest signs were missed by the remote examination approach which would have changed clinical management outcomes (Figure 2).

findings;

- Crackles Bilateral basal crepitations
- Wheeze
- No findings (a normal examination)

The outcomes evaluated for 79 patients were:

- 1. Positive findings (crackles, bilateral basal crepitations or wheeze confirmed by both Arc and F2F);
- 2. Positive unique findings (above findings confirmed by only one method of examination, either Arc or F2F);
- 3. No findings (normal examination using both Arc and F2F).

Summary Box

Remote examination with the digital stethoscope on an Arc Health station has a similar efficacy to face-to-face examinations.

No significantly abnormal chest signs which would affect clinical management were missed using Arc Health.

Some user variability was demonstrated with F2F examination findings.

These findings further support the reliability, reproducibility and safety profile of the Arc Health digital stethoscope.



Figure 1 – Arc Health Station Stethoscope findings vs. F2F examination findings

ARC vs. F2F auscultation findings



Figure 2 – Arc Health vs. F2F auscultation findings

In only two cases, Arc examination reported positively unique findings of crackles which were not validated via F2F assessment. The outcome to treatment changed from an initial thought of prescribing an antibiotic to deciding against the prescription.

In only three cases, F2F reported positively unique findings which were not reported by Arc examination. These clinical findings were minor scattered wheezes in two cases and minor scattered rhonchi in one case. The clinical management outcome of each of these three cases did not change following the discovery of the signs on F2F. These findings were all reported by the same clinician which could demonstrate some user variability.

Implication for care

In the current climate, GP consultations are largely remote without the Arc Health stethoscope is unlikely to miss significant clinical findings in both adults and children with respiratory presenting complaints. The statistics indicate that the Arc digital stethoscope demonstrates consistency and reproducibility in auscultation findings, supporting the efficacy of the technology (McNemara P value = 0.1).

Remote examination technology such as Arc Health can bridge the gap between remote consultations and F2F contact. The technology allows HCPs to visualise and examine the whole patient in a consistent and efficient manner.

A limitation to the study includes clinician variability. In only 2.5% (2/79) of patients, the clinical outcome changed to reconsideration of an antibiotic prescription after F2F examination. The signs found in Arc but not F2F and vice versa were with the same clinician, thus highlighting a slight user-dependency bias for examination findings which should be considered.

Bromley GP Alliance utilised the Arc Health station in a Covid19 respiratory hub increasing access to care, streamlining safe infection control measures during the pandemic. With the overwhelming need for increased access to high-quality care, Arc remote examination technology could provide solutions in setting up local respiratory diagnostics hubs, for example:

- Community breathlessness services for COPD / Asthma
- Virtual respiratory reviews in care homes or other primary care community settings
- Urgent care centres / A&E & OOH settings
- Branch or Satellite GP sites where clinicians are not required onsite
- Pharmacy settings for minor illness

Future development on this study could focus on specific clinical management outcomes (chest infections, asthma exacerbation) or evaluating the efficacy of Arc Health stations in other settings such as care homes or even pharmacies. Additionally evaluating patient satisfaction with use of the innovation would be vital to implementing the wider use of the Arc Health station.

References

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