Something old, something new …monitoring and wearables for patient safety

P176 PRELIMINARY RESULTS OF 'AT RISK' ASTHMA AND COPD REVIEWS BY SPECIALIST TEAMS IN PRIMARY CARE

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Background Respiratory disease is a common cause for primary care consultations, and increasingly, patients with complex and 'high-risk' lung disease are managed in the community. Variation in the quality of community management of 'high-risk' patients may lead to sub-optimal outcomes for some. The ASSIST study (REC: 16/5C/0629) has implemented a complex intervention aimed at identifying and optimising the management of asthma and/or COPD patients in primary care, in 'at risk' patients.
Method Patients with documented asthma and/or COPD were identified through 'Read code' searches of GP practice records. A DOSE score ≥3 defined 'at risk' COPD patients, whilst 'at risk' asthma patients were defined using a search algorithm identifying factors associated with poor control (including previous exacerbations and high bronchodilator requirements). The DOSE and asthma algorithms were run in 12 and 8 GP practices respectively. All eligible patients were invited to attend their GP practice for a specialist respiratory review.
Results A total of 464 patients were invited, 66 responded but only 35 were enrolled onto the study due to exclusions and drop-outs. 54% were male with a mean age of 67.23 (SD: 13.07). 16 (46%) patients had asthma, 15 (43%) had COPD, 4 (11%) had asthma/COPD overlap (ACO). Mean pack year was 40.96 (SD: 30.62), 4 patients (11%) were current-smokers, whilst 7 (20%) were never-smokers. Median FEV_1 was 1.43 litres (IQR 0.97–2.17) and FEV_1% predicted was 61% (IQR: 41%–109%). The primary diagnosis was changed in 12 (34%) patients. Changes to inhaled medications were recommended in 18 (51%) cases (including change of device/s, and/or addition of spacers), further tests were requested in 17 (49%) cases and onward referral for specialist review was advised in 19 (54%) cases.
Conclusions It is possible to identify high-risk patients from electronic GP record searches, although only a minority will attend, when invited, for subsequent review. Actions to improve outcomes, including diagnosis and treatment changes and onward referral, resulted for most patients. 12 month follow up data will evaluate patient reported outcomes, health care resource usage and overall cost effectiveness of the intervention.

P177 CARDIORESPIRATORY PHYSIOLOGY REMOTELY MONITORED VIA WEARABLE WRISTBAND PHOTOPLETHYSMOGRAPHY: FEASIBILITY AND INITIAL BENCHMARKING

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Background The ability to reliably remotely monitor physiological data including heart rate, respiratory rate and oxygen saturation in clinical scenarios such as in patients at risk for exacerbations of respiratory disease, patients at risk for progression to ventilatory failure and patients during home NIV setup would be of significant benefit. Advances in connected wearable device signal acquisition, data analysis and cloud-based computing make acquisition and real-time clinical monitoring of advanced biometric data a realistic prospect. The Wavelet photo-plethysmography (PPG) wristband and Wavelet health platform capture multiple physiological signals – an advance on activity and heart rate monitoring within standard wearable devices. These biometrics are surfaced via Bluetooth paired smartphone or tablet app for clinician review. Feasibility and benchmarking in the clinical environment is a necessary first step before testing the prospective value of these remote monitored wearable-derived physiology measurements.
Methods Patient setup, wristband sampling rate options and comparison of Wavelet derived heart rate (HR), heart rate variability (HRV), respiratory rate (RR) and oxygen saturation (SpO2) measurements across multiple nights have so far been evaluated in 9 patients undergoing sleep studies and/or CPAP or NIV initiation. Wavelet data was compared with simultaneously acquired 1st night single lead ECG, finger-probe SpO2 (Somnomedics polysomnography, S-Med) and transcutaneous HR and SpO2 (TCM5, Radiometer) data.
Results Wavelet dashboard and device setup was straightforward, with reliable data acquisition. Patient feedback on device acceptability has been positive. There was an encouraging corroboration between Wavelet acquired HR, HRV, RR and SpO2 and simultaneous ECG lead, finger probe and transcutaneous diagnostic monitoring. Standard deviation of absolute deviation for Wavelet derived HR (0.91), RR (0.82) and SpO2 (1.41) is encouraging indication of device accuracy, mirroring other recently acquired data.[1]
Conclusions Feasibility and early accuracy data from the wearable PPG device and remote-monitoring platform is encouraging. These preliminary results suggest that this device may be suitable for prospective clinical trials, for example evaluating utility of wearable physiological monitoring in digitally-enabled preventative service models for respiratory disorders.

REFERENCE

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P178 HOME REMOTE-MONITORED AUTO-NIV: REALISTIC PROVISION AND IMPROVED PROJECTED ADMISSION-FREE SURVIVAL IN PATIENTS WITH CHRONIC HYPERCAPNIC COPD

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Background The UK HOT-HMV-COPD study confirms benefit from home NIV in hypercapnic severe COPD patients. Home NIV provision presents clinical and service challenges, with repeated attendances and elective admission(s) unrealistic for COPD patients. 2-way remote monitoring and volume assured pressure support with auto-titrating EPAP (auto-NIV) modes offer prospects for realistic NIV optimisation and rationalised follow up.

Methods 46 patients with chronic hypercapnic COPD commenced remote-monitored home NIV in iVAPS-autoEPAP mode (Lumis, Airview, ResMed) between Feb-17 – Jan-18. Admission-free survival was compared with a cohort of COPD patients who survived an episode requiring acute-NIV, prior to home NIV service adoption.

Results Day-case NIV initiation was possible in 15/46 patients; 29 patients commenced NIV during index acute admission, including 7 patients as outreach to regional base hospitals. 36/46 continued NIV in volume-assured mode, 10 were switched to ST mode. Auto-EPAP component was discontinued in 18 patients. Follow up was individualised, typically requiring 6 data reviews, 2 telephone consultations and 1 remote prescription change. 15 patients required additional domiciliary nurse visit and 10 required additional day-case review to consolidate therapy. 11 patients were ultimately intolerant of home NIV despite all support; remote monitoring data justified ventilator retrieval. Median decrease in bicarbonate of 4.9 mmol/L ($p<0.0151$) and PCO2 2.2 kPa ($p<0.032$) confirmed control of hypoventilation. Median time to re-admission or death in patients who continued optimised home NIV was 28 weeks, vs 12 weeks in historical acute NIV cohort.

Conclusions Remote monitored auto-NIV facilitates treatment uptake, optimisation of home NIV and control of hypoventilation in patients with severe COPD. Admission-free survival improved from that projected from historical cohort, mirroring RCT outcomes.

P179 PATIENT SAFETY ALERT: A PROSPECTIVE STUDY ON 100 PATIENTS HIGHLIGHTING INACCURACY OF PULSE OXIMETER FINGER PROBES USED ON EAR LOBES

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Introduction Clinicians often obtain peripheral saturation (SpO2) readings by placing a finger probe sensor on the patient's earlobe when a reading cannot be obtained from the finger. The accuracy of this method is unknown, and is not recommended by the manufacturers of oximeters.

Objectives To assess the accuracy of oxygen saturations measured by a pulse oximeter finger probe on earlobes compared to saturations on arterial blood gases (ABGs).

Method We performed a prospective study on 100 patients attending the oxygen clinic at a teaching hospital from September 2017 to May 2018. All patients who were routinely due to have ABGs performed were included, and informed verbal consent was taken.

Saturations were recorded using a Masimo Rad5v oximeter for finger probe on the finger, finger probe on earlobe, and ear probe on earlobe. These were compared to saturations recorded on ABGs performed on the same clinic visit as a gold standard utilising a Radiometer ABL 90 flex ABG machine. We defined 'accurate' SpO2 as being ±2% of the SaO2 on the ABG. The degree of variation of SpO2 from SaO2 was stratified into ≤2%,≤3%,≤4%, and >4%.

Results As demonstrated in table 1, using a finger probe on the finger gave the most accurate SpO2 readings compared to the ABG. Using a finger probe on the earlobe was the least accurate with only 7% readings being within ±2% of SaO2. Using a more 'lenient' definition of accuracy as variation of ≤4% compared to SaO2, the accuracy of finger probe on finger, ear probe on earlobe, and finger probe on earlobe were 94%, 79% and 37% respectively.

Abstract P179 Table 1

	Finger probe on finger	Ear probe on earlobe	Finger probe on earlobe
Range of difference compared to SaO2	0%–7%	0%–9.6%	0.1%–12%
Mean difference compared to SaO2	1.7%	2.9%	5%
% accuracy (≤2% variation compared to SaO2)	68%	39%	7%
% accuracy (≤3% variation compared to SaO2)	86%	64%	23%
% accuracy (≤4% variation compared to SaO2)	94%	79%	37%

In all cases (n=100), using a finger probe on the earlobe over-estimated the oxygen saturations with values ranging from 0.1% to 12% (mean 5%) greater than SaO2, highlighting that this method was inaccurate, and potentially exposed patients to the risk of clinicians under-estimating the degree of hypoxemia.

Conclusions This study highlights that the practice of using pulse oximeter finger probes on ear lobes when saturations are difficult to record on a finger is inaccurate and potentially risky.

P180 USING PATIENT SPECIFIC PROTOCOLS (PSP) TO ACHIEVE APPROPRIATE OXYGENATION IN PATIENTS AT RISK OF OXYGEN TOXICITY; FROM AMBULANCE THROUGH TO INPATIENT STAY

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Introduction and objectives The London Ambulance Service (LAS) uses Patient Specific Protocols(PSPs) as directives for a range of conditions. Since 2006[1] we have worked with LAS using PSPs to prevent oxygen(O^2) toxicity during ambulance transfer in patients at risk of type 2 respiratory failure. PSPs are now 'flagged' on our records which may also influence hospital oxygen prescribing. The aim of this study was to evaluate PSP effectiveness in influencing appropriate O^2 prescribing during both ambulance transfer and hospital stay.

Methods Data from 50 patients identified as at risk of oxygen toxicity(disease severity and/or raised bicarbonate) who had PSPs initiated sequentially pre-May 2017 were reviewed for; initiation bicarbonate, ED attendances, prescription and delivery of O2 in ambulance/ED/wards, and death in the subsequent year.

Results Hospital records were reviewed for 43/50 (86%) patients with PSPs. Patient characteristics are shown in table 1. In the year post-PSP 20/43 (46.5%) had ≥1 hospital attendance (overall 44 attendances); there were 2 deaths(not O2-related).

LAS data were available for 34/44 (77%) attendances. 30/34 (88.2%) were appropriately oxygenated during ambulance