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Short communication

The impact of the COVID-19 pandemic on home mechanical ventilation services: A national survey

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ABSTRACT

The COVID-19 pandemic has caused major disruption to healthcare services globally. We present the findings of a national survey of home mechanical ventilation (HMV) services in England and Wales. 30 HMV services (60%) responded. There was a significant reduction in outpatient services with 93% of services not offering routine face-to-face appointments, although most centres were able to offer emergency appointments for ventilation review and set-up. HMV inpatient capacity was reassigned, and HMV service staff re-deployed in the majority of centres (97%). The initial wave of the COVID-19 pandemic left a service backlog of a median of 87 outpatient appointments [range 0–1500] and a median of 4 patients (range 0–100) awaiting NIV set-up.

Authorship statement

All authors were involved in designing the survey. AJS, ESS, AA and SM analysed and interpreted the survey data and wrote the initial manuscript. All authors contributed to the revision and the final approval of the manuscript.

1. Introduction

The Coronavirus disease 2019 (COVID-19) pandemic has caused significant disruption to health services worldwide. A World Health Organisation (WHO) survey assessing the impact of COVID-19 showed global disruption with 90% of countries experiencing a disruption to some extent, 76% reporting reductions in outpatient services and 66% cancelling elective services. 49% re-deployed staff to provide COVID-19 relief [1]. During the first national lockdown, UK hospitals underwent dramatic changes with significant restructuring. However, there is a paucity of data on the impact on specific services.

Home mechanical ventilation (HMV) services in the England and

Wales have been significantly affected by the pandemic, with patients in chronic respiratory failure being asked to shield due to their underlying clinical vulnerability. Furthermore, there was also a reduction in service provision due to re-allocation of clinical resources to the pandemic effort and safety concerns arising from the aerosol-generating nature of non-invasive ventilation. We conducted a survey of HMV services in England and Wales to see how centres were affected during the first wave of the COVID-19 pandemic, in order to understand how continuity of service provision can be maintained in future.

2. Methods

We developed a 10-item survey which looked at aspects of service provision by HMV centres in England and Wales including: sleep studies, elective admissions, outpatient appointments, non-invasive ventilation (NIV) interface reviews, HMV service staff redeployment, and equipment supply issues (supplementary material). The survey focused on the period 23rd March to June 1, 2020, thus capturing the peak of hospitalisations. We also asked centres to estimate the extent of their service

Abbreviations: COVID-19, Coronavirus disease 2019; HMV, Home mechanical ventilation; NIV, Non-invasive ventilation; SiLVaH, Specialists in Long-term Ventilation at Home; WHO, World Health Organisation.

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backlog during the recovery phase (i.e., after June 1, 2020) and whether going forward they would undertake mainly face-to-face, video or telephone appointments. The survey was emailed to all members of the Specialists in Long-term Ventilation at Home (SiLVaH) group, as well as being posted on Twitter, and responses were collected between 11th September and November 24, 2020. We ensured that there was no double reporting from centres. While it is not possible to appreciate the full number of HMV centres that could have responded given the survey was posted on Twitter, there are 50 NHS hospital trusts in England and Wales that are members of the SiLVaH group.

3. Results

A total of 30 HMV services (60%) responded and completed the survey in full: ten (33%) services usually initiated non-invasive ventilation (NIV); 18 (60%) initiated both NIV and tracheostomy ventilation (TV); and two (7%) did not normally initiate NIV but offered ongoing follow-up and titration of NIV. A significant number of investigations that were usually provided by hospitals were not during the study period (Fig. 1a and b). This was especially true for more labour-intensive investigations such as a full polysomnography where only 5% (1/18) of centres who normally offered the service provided it during the study period.



Fig. 1. Disruption caused by the pandemic to ventilation services across England and Wales a) Investigations provided (any form) during the pandemic. The X-axis represents the total number of centres that normally provide these investigations. b) Inpatient investigations provided during the pandemic. The X-axis represents the total number of centres that normally provide these investigations. c) Staff re-deployment during the pandemic.

During the study period, all HMV services with inpatient capacity ($n = 25$) reassigned their inpatient area as medical wards (10/25; 40%), high dependency units (4/25; 16%), intensive care units (3/25; 12%) or a combination of these (8/25; 32%). HMV staff were re-deployed to other clinical areas in the majority (29/30; 97%) of services (Fig. 1c).

Services reported difficulties in maintaining their supplies of ventilators (47%, 14/30), NIV interfaces (67%, 20/30), and tracheostomy tubes (30%, 6/20). Many of the hospitals with NIV interface supply issues had difficulty accessing non-vented masks (60%, 12/20). Moreover, 75% (18/24) of HMV services reported other supply difficulties, including in obtaining circuits and filters.

There was large-scale disruption to outpatient services: only 7% (2/30) of services continued to provide routine face-face appointments during the study period, while 70% (21/30) were able to offer urgent face-face appointments. The majority, 79% (23/39), were able to offer NIV set-up clinics; 54% (14/26) continued NIV interface reviews; 64% (18/28) provided ventilator servicing/repair services and 47% (8/17) provided airway secretion clinics. Non-vented masks were recommended by 7% (2/30) of services for their community patient population.

At the time of responding to the survey, 83% (25/30) of hospitals had managed partially or fully to assess the extent of their service backlog. HMV services had a median of 87 (range 0–1500) patients awaiting outpatient review, but smaller numbers awaiting NIV set-up (median 4; range 0–100) and starting tracheostomy ventilation (median 0, range 0–50). There were a median of 34 (range 0–200) patients awaiting limited respiratory polygraphy. With regards to future service delivery preference, 77% (23/30) of centres are planning on conducting some or most of their consultations via video appointments with 97% (29/30) of centres planning on using telephone appointments.

4. Discussion

The results of this survey demonstrate the significant disruption to HMV services across England and Wales during the first wave of the COVID-19 pandemic. There was a major impact on routine outpatient consultations and NIV set-up clinics; however, most centres were able to offer emergency face-to-face consultations and NIV set-up, mitigating potential delays in treatment for patients in chronic respiratory failure. Most centres advised patients to continue using their normal vented masked in the community, as per contemporaneous British Thoracic Society (BTS) guidance [2]. HMV service staff in most centres were re-deployed to other clinical roles, with a concomitant re-assignment of dedicated clinical space to the pandemic effort, resulting in a substantial backlog of investigations and treatment for centres to deal with. In an effort to address this, and in light of the ongoing recommendation for extremely vulnerable patients to shield at home, HMV centres are increasing their use of video and telephone consultations, reserving face-to-face appointments for urgent cases, in line with current BTS guidance [2] and international expert opinion [3]. There is prior evidence on the success of remote monitoring with regards to NIV adherence and efficacy [4] and therefore HMV services may well be suited to telemedicine. However, a recent European study looking at sleep apnoea management concluded that telemedicine was only adopted by a minority of patients [5]. Although this was perhaps a cost issue [3,5], which would not necessarily be the case in the UK. There are clear advantages for patients, with video or telephone consultations providing ease of access, especially for patients with disability, needing hospital transport or travelling long distances. This has the potential benefit to improve patient satisfaction and quality of life. However, there are undoubtedly also advantages to face-to-face reviews, especially for individuals who struggle with technology where telemedicine can be more stressful. There is also digital inequality nationally, with some patients struggling with internet speeds to be able to use telemedicine effectively. Given the current large-scale change in healthcare delivery, a randomised trial is needed comparing the efficacy of telemedicine in HMV

compared to face-to-face consultations leads to better outcomes. Moreover, the concept and role of a 'care manager' should also be investigated. Ciccone et al. have previously shown that care managers, acting as a bridge between physicians, specialists and patients had a positive role and benefited patients with heart failure and diabetes [6]. This idea is yet to be tested in an HMV population but could add vital support to an unwell group of patients. For future waves and pandemics, there may also be merit in collaboration of services, whereby larger HMV centres help support smaller services where resources may be limited.

There are limitations to this work, including the use of a self-reported physician survey which could have introduced an element of bias given that there was no objective control of the data. While the sample size is small, it is likely to represent around 60% of HMV services in England and Wales and so does give a good idea of HMV service pressure during the pandemic. Responses are also likely to have been reduced somewhat by the pandemic pressure. Finally, the survey was not able to gain information about the efficacy and success of the alternative strategies used, something that future work should aim to do.

This survey demonstrates the major impact that the COVID-19 pandemic has had on HMV services. It remains to be seen whether the inevitable service disruption wrought by the COVID-19 pandemic has had an adverse effect on patient survival, and research into new and innovative solutions with regards to home monitoring and video consultations is a priority to safeguard the future of patients on long term home mechanical ventilation.

Declaration of competing interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.rmed.2022.106831>.

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