

# Virtual ‘robot’ ward rounds: older trauma patients’ perceptions of inpatient virtual consultations

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## ABSTRACT

**Use of telemedicine has increased following the Coronavirus 2019 (COVID-19) pandemic; however, much of the literature is based in outpatient settings. There have also historically been concerns about the efficacy of telemedicine in older patients. This service evaluation implemented virtual consultations into the ward-round setting, using a ‘robot’ device. Twenty-six older patients undergoing major trauma surgery were surveyed, with all reporting very high satisfaction rates. Ninety percent of patients were ‘very happy’ or ‘happy’ with the remote consultations, and 83% found the technology ‘easy’ or ‘very easy’ to use. This evaluation is limited by small participant numbers and did not research health outcomes following virtual consultations. To conclude, the use of ‘robots’ to deliver remote consultations to patients is feasible and welcomed by most patients**

**KEYWORDS:** trauma surgery, older people, telemedicine, virtual consultations

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## Introduction

‘Telemedicine’ is the delivery of healthcare services using information and communication technologies, including real-time audio-visual consultations.<sup>1</sup> The use of technology in healthcare is a rapidly expanding area of research. There has recently been interest in using technology to lessen burdens on the NHS, which have been exacerbated by an ageing population, increases in chronic illnesses and understaffing. There is hope that a move toward telephone and video consultations could bridge the gap between supply and demand in healthcare. Virtual consultations

(VCs) have the potential to reduce costs for both patient and healthcare providers by reducing transport costs<sup>2</sup> and ‘failure to attend’ occurrences.<sup>3</sup> There is some evidence that virtual clinics are quicker than face-to-face clinics, and that waiting times are shorter for virtual reviews.<sup>4</sup>

The demand for such technology has accelerated most recently because of the Coronavirus 2019 (COVID-19) pandemic. The need to limit patient and staff exposure to the virus, in addition to pressures created by staff sickness, redeployment and increased inpatient numbers, meant that many outpatient clinics and primary care consultations rapidly became virtual. By April 2020, the use of telephone consultations overtook face-to-face consultations in general practice for the first time in the NHS; by comparison, telephone consultations had comprised only 20% of GP consultations 2 months previously.<sup>5</sup> VCs have been essential in the management of the pandemic, by reducing the risk of transmission to patients and by reducing the use of personal protective equipment.<sup>6</sup> Telemedicine might have also had the benefit of mitigating staff absences, by allowing staff to continue working from home while shielding or isolating.

Historically, there have been concerns that VCs would lead to poorer clinical care and a reduction in patient satisfaction, but evidence shows that patients often view VCs in a positive light. The VOCAL study (2018)<sup>7</sup> demonstrated that many of the data surrounding the use of telemedicine are positive, with high levels of patient satisfaction reported in most of the literature. However, the authors comment that there remains a lack of high-quality, large-scale trials. A review concerning the use of VCs in patients with long-term conditions concluded that videoconferencing is acceptable to most patients, with patients expressing satisfaction. This meta-review concluded that health outcomes in patients reviewed remotely are at least equivalent to those reviewed face-to-face. However, the evidence regarding clinical outcomes in this area remains weak.<sup>8</sup>

Research into the use of telemedicine for inpatients is sparse, because, historically, there have been limited situations that would necessitate inpatient virtual reviews. Recent feasibility studies on the use of ‘tele-rounding’ (performing inpatient ward rounds virtually using an audiovisual link) have demonstrated high rates of clinician and patient satisfaction. In one study, 89.1% of feedback from a colorectal ward trialling tele-rounding was positive, and none was negative. Only 5.5% of encounters were troubled with technological difficulties. However, this study did not survey every patient, and feedback was given in an informal

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verbal manner. Therefore, a more formal study focusing on patient perception might be beneficial.<sup>9</sup> A 2018 study utilised a 'robot' to enable virtual inpatient surgical ward rounds, and found that 96% of patients felt this was an acceptable alternative to the consultant's physical presence. In this study, 42.3% of patients were aged over 65, but a subgroup analysis was not provided; thus, data pertaining specifically to older patients could not be studied. This study also found high levels of staff satisfaction, with 100% of nurses and 80% of junior doctors agreeing that communication via the 'robot' was adequate. The authors commented that a 'robot' design, as opposed to other methods of videoconferencing, was beneficial because of the manoeuvrability of the device, allowing the controller to mimicking human interaction.<sup>10</sup> One 2009 study in rural Australia found a ward-based geriatric service delivered via VCs to be cost-effective and an acceptable alternative to in-person consultations by both patients and staff.<sup>11</sup>

Historically, there have been concerns that VCs and other forms of telemedicine would be less effective in the older population. This includes concerns that older patients might be limited by reduced cognition, hearing and visual impairments, and lack of familiarity with the technology. However, a literature review from 2007 found that older patients' satisfaction with telemedicine was high, and that telemedicine could be safe and effective across a range of clinical settings.<sup>12</sup> Conversely, a review published in 2015 found that older patients were more likely to decline participation in telemedicine research, suggesting that older patients' perceptions of the technology could be under-researched compared with younger age groups.<sup>13</sup> A rapid review of virtual geriatric encounters, implemented during the COVID-19 pandemic, found that nine observational studies had been conducted, studying 975 older age adults and their use of VCs. All studies reported high degrees of patient satisfaction; the three studies that reported the proportion of satisfied patients reported rates of 92–98%. All patients who were asked reported that they would use VCs again.<sup>4</sup> Similarly, in a study utilising robot-assisted ward rounds, 96.08% of patients felt that these were a satisfactory alternative when consultant physical presence was not possible; however, only three of these patients were older than 80 years of age.<sup>10</sup> In these studies, both patients and doctors reported challenges, which included lack of physical examination, difficulties with hearing impairment and technical difficulties.<sup>4,10</sup> Interestingly, one study of 168 patients found that patients over 80 were five times more likely to state that they would not continue with telemedicine compared with patients under 70.<sup>14</sup>

Older patients with major trauma have been traditionally cared for by trauma or orthopaedic surgeons. Over recent years, there has been an awareness that, because these patients often have complex needs, geriatrician involvement utilising Comprehensive Geriatric Assessment might be the most suitable way for these needs to be addressed. A Best Practice Tariff for Major Trauma patients was brought into the UK, requiring that all major trauma patients aged 65 and above are to have a frailty assessment by a geriatrician (registrar or consultant).<sup>15</sup> The numbers of geriatricians available nationally are insufficient to meet this growing demand and issues during the pandemic, as highlighted above, meant meeting this target was even more challenging.

In the Major Trauma Centre where this study was based, a consultant geriatrician ward round would usually occur three times a week.<sup>16</sup> Given COVID-19 guidelines, one of the trauma geriatricians was required to shield for several weeks. Telemedicine

was utilised to enable this consultant to continue to fulfil this clinical commitment of providing a liaison service. Acknowledging the concerns highlighted about how older patients would respond to technology, we wished to evaluate their experience. The primary aim of this project was to perform a small pilot evaluation of the acceptability and feasibility of remote inpatient ward rounds using a 'robot' in older trauma patients at a London Major Trauma Centre. The second aim was to explore older trauma patients' evaluation of this use of telemedicine.

## Method

### Technology used

Virtual consultations were performed using the Double Robotics Double 3 Robot (referred to in this article as the 'robot'). This technology comprises a screen, mounted at standing height on a two-wheeled device alongside microphones and cameras, allowing real-time videoconferencing. The person attending remotely via the robot is able to steer the robot unassisted from their computer. The clinician also had remote access on another computer attached to the hospital's network, providing access to the electronic clinical record, including all nursing notes, observations, blood results, scans and drug charts.

### Service evaluation process

Between September and November 2021, patients aged 65 years or older admitted under the major trauma service, without cognitive impairment and with the ability to speak English, were informed that the consultant would review their care virtually. Cognitive impairment was evaluated using the 4AT scale. The reasons for this were explained and the patients were given the opportunity to opt out without any detriment to their care. They were provided with a leaflet consolidating the details of the study (see supplementary material S1).

Patients were provided with an anonymised paper questionnaire comprising four 'yes' or 'no' questions, including whether they had prior experience of remote consultations. This was followed by seven Linkert scale questions measuring various aspects of patient satisfaction. There was also space to provide additional comments (see supplementary material S2). To maintain participant anonymity, no personal or identifiable information was gathered in the questionnaire. Responses were analysed using descriptive statistics (percentages) and the questionnaire answers were reviewed for comment themes and suggestions.

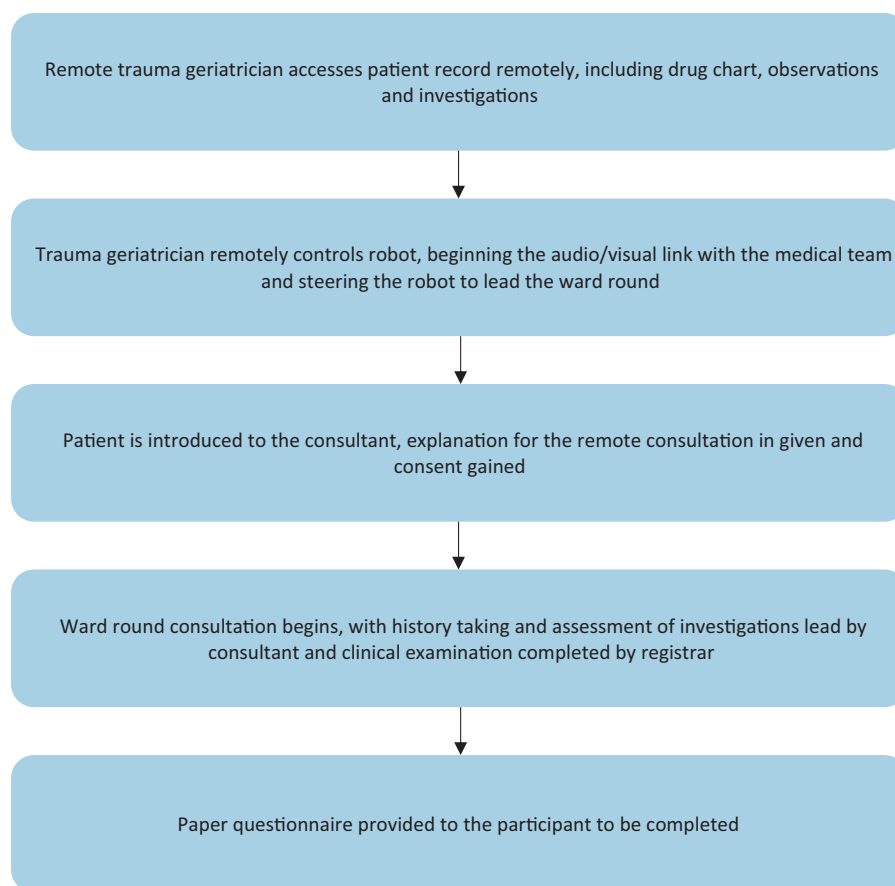
Fig 1 summarises the sequence of events for patients reviewed by virtual ward round.

### Ethics

In line with the Health Research Authority decision-making framework, this project was conducted as a service improvement and evaluation.<sup>17</sup> All interactions with the patients were completed as part of their routine clinical care.

## Results

Overall, 26 patients aged 65 and over received their consultation via the robot and, of these, four participants also had a second remote consultation. Three patients had relatives with them at



**Fig 1.** Sequence of events for patients reviewed by virtual ward round.

the time of the consultation and questionnaire completion, and their feelings were also recorded. In total, 15 patients provided qualitative feedback.

Of patients, 77% reported that this was their first experience of VCs. Fig 2 portrays the answers to the initial yes or no questions. Most patients (88%) reported understanding why the remote consultations were necessary, and 92% stated that they understood the consultant. Eight percent found the experience frightening.

Overall, patient satisfaction was very high. Of the 26 initial patient surveys, 77% reported that the consultation was 'effective' or 'very effective', with no patients responding negatively. When asked how comfortable they were with the consultation, 89% of patients gave a positive response. Most patients (93%) reported that they were 'very happy' or 'happy' with their care and treatment throughout the remote consultation, with only 4% giving a negative response.

Despite this, only 73% stated that they were 'likely' or 'very likely' to recommend remote consultations. Regarding the quality of the technology itself, 81% of patients felt that the technology was 'easy' or 'very easy' to use, and 89% felt that the quality of the video/audio link was 'good' or 'very good'. The answers to the Linkert scale questions are displayed in Fig 3.

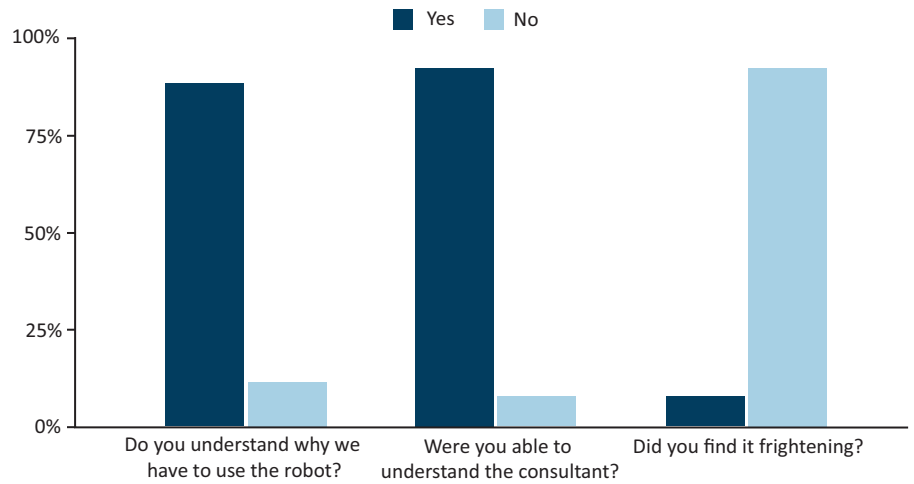
Of the relatives who were present during the remote consultation, 100% found the consultation to be effective. Four patients were surveyed a second time, having had a repeat VC later on during their admission. All four patients felt that the

experience was better on their second consultation, because they were more familiar with the format.

Qualitative feedback predominantly suggested improvements that were largely related to the technological issues (Table 1), with one participant commenting that headphones might have improved their experience. Another felt that they struggled to see the consultant clearly, and sometimes were not sure whether the consultant could see them. Two patients mentioned that they appreciated the support of the registrar and foundation doctor, and felt that the physical presence of doctors on the ward round allowed the consultation to run more smoothly. In addition, five participants expanded on how effective they felt the remote consultation was, and that the consultant was still able to convey kindness and understanding through the remote consultation.

## Discussion

The results of this evaluation indicate that VCs using a robot offer a feasible approach to providing patient consultations, with high levels of patient satisfaction in this setting of a liaison ward round of older trauma patients. This could be replicated in other circumstances, where senior clinicians are unable to be present on site. For example, it could be used to improve the sharing of expertise between smaller hospitals and tertiary centres. Although remote reviews of notes and results are common, the main advantage of the 'robot' is that it allows for a visual assessment of the patient without clinicians needing to travel to another site.



**Fig 2.** Patient responses to initial questions around understanding of the technology.

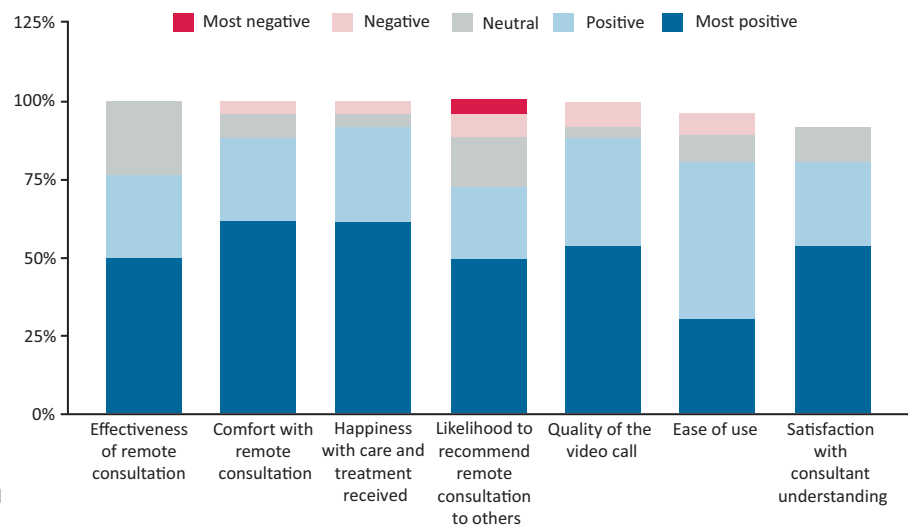
There are also benefits to individual staff members and healthcare organisations. In this setting, remote consultations allowed a service to continue to be delivered by a senior clinician despite occupational health limitations resulting from the pandemic. In future, this technology could be used to allow more flexible working conditions and improve off-site working. More flexible working conditions are likely to benefit staff members who are pregnant, have caring commitments or disabilities, by allowing them to continue clinical work while not being physically present in clinical settings. Flexible working is recommended by NHS employers as a mechanism to reduce inequality in the workplace with benefits such as reducing the gender pay gap.<sup>18</sup>

Concerns that older patients might have negative perceptions about care that is delivered remotely were found to be largely untrue, with most patients that we surveyed responding positively toward the robot ward rounds. The data we have collected, along with data collected in the VOCAL study and others, indicate that members of the older population are open to the use of technology to facilitate healthcare.<sup>4,7,14,16</sup> It is important as healthcare professionals that we do not make

negative assumptions about older patients' receptiveness and understanding of new technologies. Older patients comprise a heterogeneous group and, although advanced age might bring impairments that make using telemedicine difficult, older patients should not be excluded from innovations that might benefit them on the basis of age alone.

The satisfaction levels found in our cohort are comparable with, or even better than, those found in similar studies of outpatients.<sup>7</sup> It is probable that utilising junior team members in person, alongside the consultant reviewing virtually, improved the efficiency and quality of the consultations, for example by enabling clinical examination of patients. It is possible that the level of satisfaction would be lower without the presence of junior team members.

Patients rated the quality of the audio and visuals highly, and felt that the technology was easy to use. However, a portion of the qualitative feedback that we received related to the practical use of the technology, with suggestions that headphones would improve the patient experience. This indicates that future use of similar technology should accommodate different patient needs, such as hearing impairment.



**Fig 3.** Patient responses to questions around satisfaction with the virtual ward round.

**Table 1. Qualitative comments offered by patients following virtual ward round**

Theme	Comments
<b>'What would have helped to improve the consultation?'</b>	
No changes required	'Everything was alright' 'Was fine the way it was' 'Nothing—was plain spoken, could hear clearly, experienced doctor for examining and guiding—tip top'
Technology	'Angle of robot (positioning)' 'Headphones may help improve audio' 'Helped having FY1/SpR in person to interpret if anything unclear'
Other	'The consultation was ok but face-to-face would be better' 'Would like to see what is written/shown on the computer'
<b>'Is there anything you would like to add?'</b>	
Gratitude	'Very kind and very helpful' 'Very efficient way of doing it' 'Very kind and hope it all goes well with pregnancy' 'Very friendly, very nice doctors, I'm happy.' 'I am very thankful to her and team'
Technology	'Off putting not knowing if Cons can see pt from funny angle' 'Window caused a reflection on ipad screen, but she (the patient) has gotten used to it due to speaking to family on phone' 'Could not see her properly because i could not turn my head (in collar). it was like a normal person talking'
Other	'Was against it previously but understands why it has to be done' 'I think the remote consultation perhaps does not resolve some of the issues face-to-face would resolve'

Despite the very positive response to the VCs, a small proportion of patients stated that they would not recommend the technology to others. Some additional comments expanded on this, with patients commenting that they would still prefer face-to-face consultations. This indicates that face-to-face consultations should remain the gold standard of care, but that VCs could be used as an effective alternative in exceptional circumstances. It is also a concern that a small number of patients reported that they found the experience 'frightening'. This is something to be conscious about when utilising this technology, and the onus is on clinicians to reassure patients and put them more at ease.

### Limitations

The primary limitation, in common with many VCs, was the inability of the senior attending doctor to examine the patient

when consulting with them remotely. This required a level of trust in the doctor present at the bedside and the consultations being documented using a standardised template that was also used in face-to-face consultations. This was a small-scale service evaluation of a new innovation and we recognise that there were no formal comparators during the period.

We were unable to gauge the views of the all of the relatives present in each VC because of the reduced visiting procedures during the pandemic. It would be useful to incorporate the views of relatives in future service developments in this area.

This evaluation did not assess clinical outcomes secondary to remote review. Data were not gathered to enable a comparison of the actual clinical care received by the patients who were reviewed remotely. Studies in the outpatient setting have found that clinical outcomes are as good as, and sometimes better, with VCs than face-to-face consultations.<sup>8</sup> Future research could attempt to replicate this by studying clinical outcomes among inpatients receiving healthcare virtually.

This was a small service evaluation of a specific patient group and, thus, it is not possible to generalise the findings to other populations. Future studies should assess patients in different settings, such as the medical assessment unit, general medical or rehabilitation wards. Cultural background, educational attainment and prior familiarity with technology such as smartphones and computers could be studied, and subgroup analysis could reveal which patient groups are likely to benefit the most from use of telemedicine.

### Conclusion

This small pilot evaluation suggests that the use of telemedicine in this specific inpatient setting of older trauma patients had an overall very high patient satisfaction. In addition, our findings suggest that VCs using a robot can be effectively used by older patients and that it is important not to make assumptions that age is a contraindication to the use of telemedicine. It is clear that face-to-face consultations remain the preference of many patients and that telemedicine might be best used as part of a mixed-modality team ward round. However, this form of telemedicine has the potential to provide more flexible access to healthcare, to the advantage of both patients and staff, particularly during challenging times, such as a pandemic. ■

### Supplementary material

Additional supplementary material may be found in the online version of this article at [www.rcpjournals.org/content/clinmedicine.S1-Survey](http://www.rcpjournals.org/content/clinmedicine.S1-Survey)

### References

- 1 WHO Group Consultation on Health Telematics. *A health telematics policy in support of WHO's Health-for-all strategy for global health development: report of the WHO Group Consultation on Health Telematics, 11-16 December, Geneva, 1997*. Geneva; WHO, 1998.
- 2 Snoswell CL, Taylor ML, Comans TA *et al*. Determining if telehealth can reduce health system costs: scoping review. *J Med Internet Res* 2020;22:e17298.
- 3 Snoswell CL, Comans TA. Does the choice between a telehealth and an in-person appointment change patient attendance? *Telemed J E Health* 2021;27:733–8.

- 4 Murphy RP, Dennehy KA, Costello MM *et al*. Virtual geriatric clinics and the COVID-19 catalyst: a rapid review. *Age Ageing* 2020;49:907–14.
- 5 Spencer J, Oung C. *How has lockdown affected general practice and where do we go from here?* Nuffield Trust, 2020. [www.nuffieldtrust.org.uk/news-item/how-has-lockdown-affected-general-practice-and-where-do-we-go-from-here](http://www.nuffieldtrust.org.uk/news-item/how-has-lockdown-affected-general-practice-and-where-do-we-go-from-here) [Accessed 31 July 2023].
- 6 Shirke MM, Shaikh SA, Harky A. Implications of telemedicine in oncology during the COVID-19 pandemic. *Acta Biomed* 2020;91:e2020022.
- 7 Shaw S, Wherton J, Vijayaraghavan S *et al*. Advantages and limitations of virtual online consultations in a NHS acute trust: the VOCAL mixed-methods study. *Health Serv Delivery Res* 2018;6:1–136.
- 8 Ignatowicz A, Atherton H, Bernstein CJ *et al*. Internet videoconferencing for patient–clinician consultations in long-term conditions: a review of reviews and applications in line with guidelines and recommendations. *Digit Health* 2019;5:205520761984583.
- 9 Nicholson KJ, Rosengart MR, Watson AR. Telerounding has clinical value and enables the busy surgeon: a colorectal surgeon’s ten-year experience. *Am Surg* 2022;88:2923–7.
- 10 Croghan SM, Carroll P, Ridgway PF, Gillis AE, Reade S. Robot-assisted surgical ward rounds: virtually always there. *J Innov Health Inform* 2018;25:982.
- 11 Gray LC, Wright OR, Cutler AJ, Scuffham PA, Wootton R. Geriatric ward rounds by video conference: a solution for rural hospitals. *Med J Aust* 2009;191:605–8.
- 12 Brignell M, Wootton R, Gray L. The application of telemedicine to geriatric medicine. *Age Ageing* 2007;36:369–74.
- 13 Foster A, Horspool KA, Edwards L *et al*. Who does not participate in telehealth trials and why? A cross-sectional survey. *Trials* 2015;16:258.
- 14 Morgan DG, Crossley M, Kirk A *et al*. Evaluation of telehealth for preclinic assessment and follow-up in an interprofessional rural and remote memory clinic. *J Appl Gerontol* 2011;30:304–31.
- 15 Fisher JM, Bates C, Banerjee J. The growing challenge of major trauma in older people: a role for Comprehensive Geriatric Assessment? *Age Ageing* 2017;46:709–12.
- 16 Department for Health and Social Care. Coronavirus (COVID-19): advice for pregnant employees. [www.gov.uk/government/publications/coronavirus-covid-19-advice-for-pregnant-employees/coronavirus-covid-19-advice-for-pregnant-employees](http://www.gov.uk/government/publications/coronavirus-covid-19-advice-for-pregnant-employees/coronavirus-covid-19-advice-for-pregnant-employees) [Accessed 31 July 2023].
- 17 Health Research Authority. *Defining research*. [www.hra-decisiontools.org.uk/research/docs/DefiningResearchTable\\_Oct2022.pdf](http://www.hra-decisiontools.org.uk/research/docs/DefiningResearchTable_Oct2022.pdf) [Accessed 31 July 2023].
- 18 NHS Employers. *Addressing your gender pay gap, a guide for employees*. [www.nhsemployers.org/sites/default/files/2021-06/Addressing-your-gender-pay-gap-guide.pdf](http://www.nhsemployers.org/sites/default/files/2021-06/Addressing-your-gender-pay-gap-guide.pdf) [Accessed 31 July 2023].

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