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Gray, J. and Gillgrass, K. (2020) A review of the use of technology for pedagogical purposes by students in clinical placement. *MedEdPublish*, 9 (1). 12. ISSN: 2312-7996

<https://doi.org/10.15694/mep.2020.000012.1>

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A review of the use of technology for pedagogical purposes by students in clinical placement

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Categories: Teaching and Learning, Technology

Received: 07/01/2020

Published: 14/01/2020

Abstract

Purpose: Technology is now ubiquitous and with a wide range of clinical and pedagogical applications. This study sought to assess students' use of technology on clinical placement to facilitate supporting its use.

Method: A questionnaire based review asking questions of medical, and physician associate, students at the University of Sheffield.

Results: All responding students had smartphones and utilised technology. The sites and apps used were a wider range than we were aware of raising questions of how we support students if we are ignorant of their preferred sources. There were both positive and negative perceptions of the use of mobile technology by supervisors despite the known widespread use of technology by healthcare professionals.

Conclusion: Barriers still exist to the use of the available technologies, in particular supervisor and patient perceptions, which need to be overcome to realise the full potential of technology with some key steps that can be taken to help do this.

Keywords: Medical Education; Technology, Clinical Placements; Pedagogy

Introduction

The traditional image of the medical student with white coat pockets laden with Oxford Handbooks, British National Formulary and other such weighty, but no less vital, tomes has become a thing of the past. These days most of us carry in our pocket computing power that we could only have dreamed of 20 years ago with instant access to every conceivable guideline, advice site and learning platform and without the bulk and inconvenience of books and paper. Combined with hospitals equipped with wireless internet technology this has changed to opportunity for students to utilise technology to support their education.

Clinicians are generally very technologically focussed. Work on why doctors use the internet found that a belief in the potential for improved service delivery, time saving and patient demand were factors driving increasing use (Masters, 2008). The growth of medical applications across the major smartphone platforms, as well as online learning to support medical revalidation, courses and ongoing professional development, demonstrate the embracing of technology within clinical pedagogy. Despite this it remains unclear as to whether we are clear on how best to utilise this technology, whether we using it to its full potential and whether we are actually adding value or simply delegating the role of teaching to a "platform of convenience". In 2010 researchers looking at internet based medical education commented that "different modes of course delivery suit different learners in different contexts" (Wong, Greenhalgh and Pawson, 2010) – based on this is it realistic to suggest that getting both supervisors and students to move away from the tried and tested bedside teaching methodologies can be achieved when both groups will have such a range of opinions as to the value of these learning technologies?

This piece of work looks at how students are utilising technology during clinical placements. In doing so, and responding to it, this can mean that we are better able to support their learning in a way that suits them rather than simply ourselves.

Methods

Ethical approval for the study was granted through the University of Sheffield school of education. The survey was designed collaboratively by both authors and then, for ease of distribution and data capture, put into electronic format using the Google forms application. As part of the form a mandatory electronic consent form and information sheet were included at the start of the survey.

The questions were designed to assess; what devices the students were accessing information on, whether they were utilising websites or applications, if so what types and with what purpose were they using them. We were also interested to learn more about when they were utilising them; for instance before, during or after clinical encounters. Finally, we were interested to know if the students had experienced any feedback when utilising electronic resources on clinical placements, be it negative or positive.

The survey was distributed electronically via email by the Phase directors of each clinical phase in the University of Sheffield undergraduate medical course and the postgraduate diploma in Physician Associate (PA) studies.

Results/Analysis

There were 47 responses to the survey, representing a 6% response rate (47/728). This was lower than hoped for but, due to the large volume of requests for information sent to medical students, not wholly unexpected. The male/female split of responses was 32%:64% which is fairly representative of the demographics of the course, 4% declined to declare a gender.

There was 100% smart phone and computer ownership with 40% tablet ownership. This means that apps and electronic resources can be recommended without concern for lack of equality amongst students, an oft cited barrier in widening use of electronic pedagogical aids.

Students were asked to rate their frequency of utilisation of electronic resources. The majority, 79%, utilised them every day with no students reporting they never used them. There was a fairly even split as to whether these resources were accessed via a computer or a smart phone with only 2% utilising a tablet device. Of the smartphone users 68% used apps for learning whilst the remainder purely used the smartphone to access the Internet.

To give supervisors an insight as to what resources students were using, the students were asked to list the top five applications (apps) and top five websites that they used in relation to clinical learning. There were a total of 25 apps and 28 websites given by 31 and 45 responders respectively. Only 4 of the names given were on both the app and website list suggesting that, in most cases, students use apps and websites for different purposes. The highest cited apps and sites are listed in Figure 1 and Figure 2. The remaining resources were a very diverse mix with often only 1 or 2 citations from students. All the top apps and websites were familiar to the authors but at least half weren't highlighting a lack of awareness amongst faculty as to how students are accessing information. Of note the BNF (British National Formulary) was used both in website and app format but far more in app format and a surprising number quoted Wikipedia as one of the most used websites for information which is a worry considering the fact that a lot of the information on that site is unreferenced or subject to scrutiny.

Figure 1 – The top used apps by students by number of citations

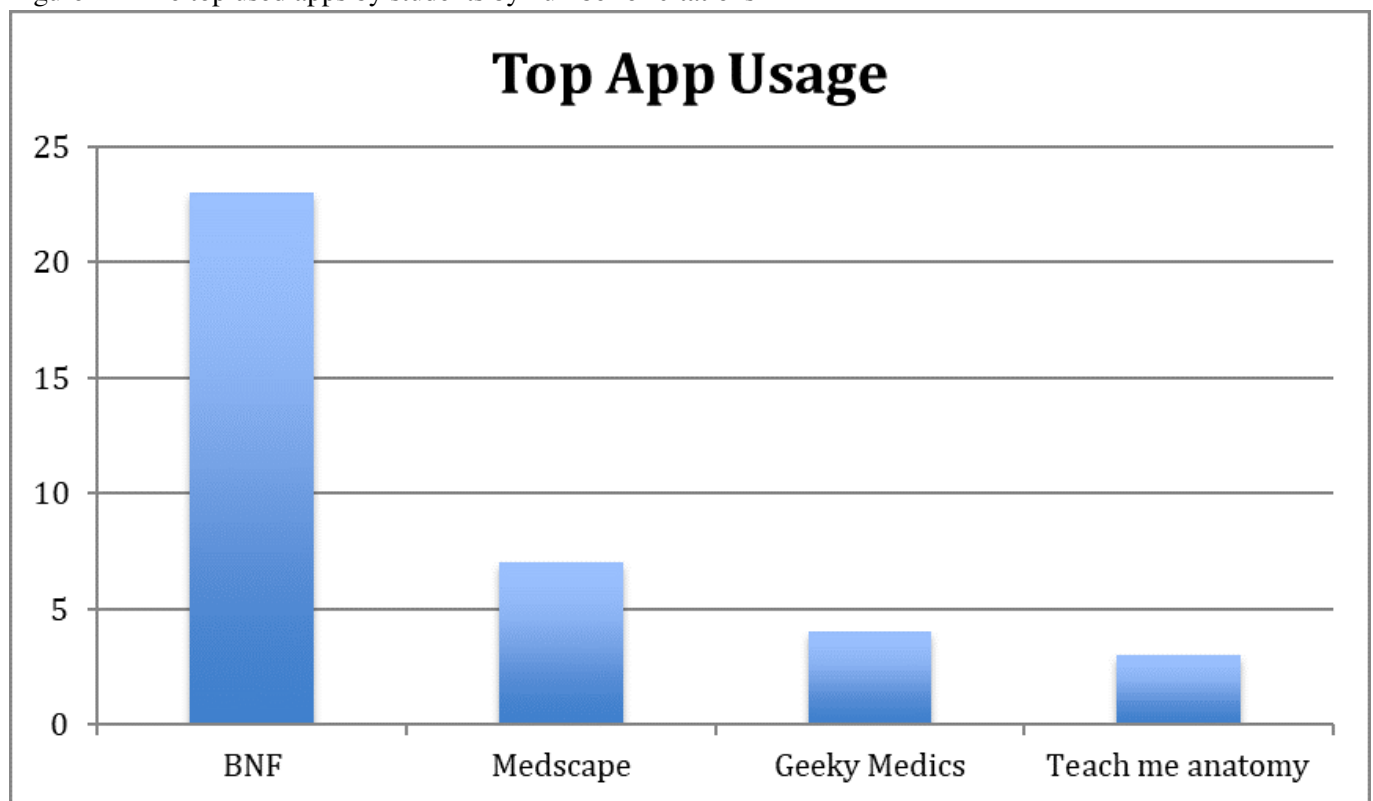
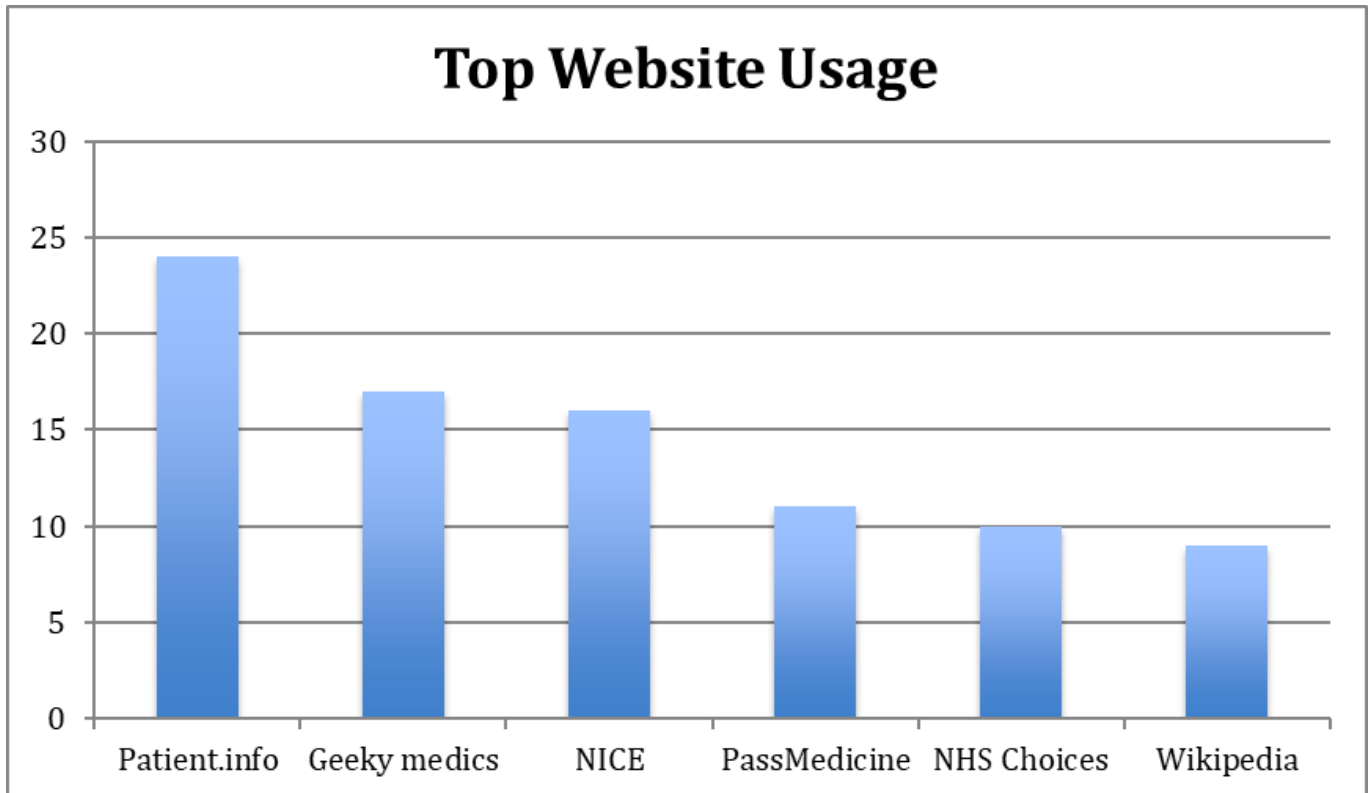


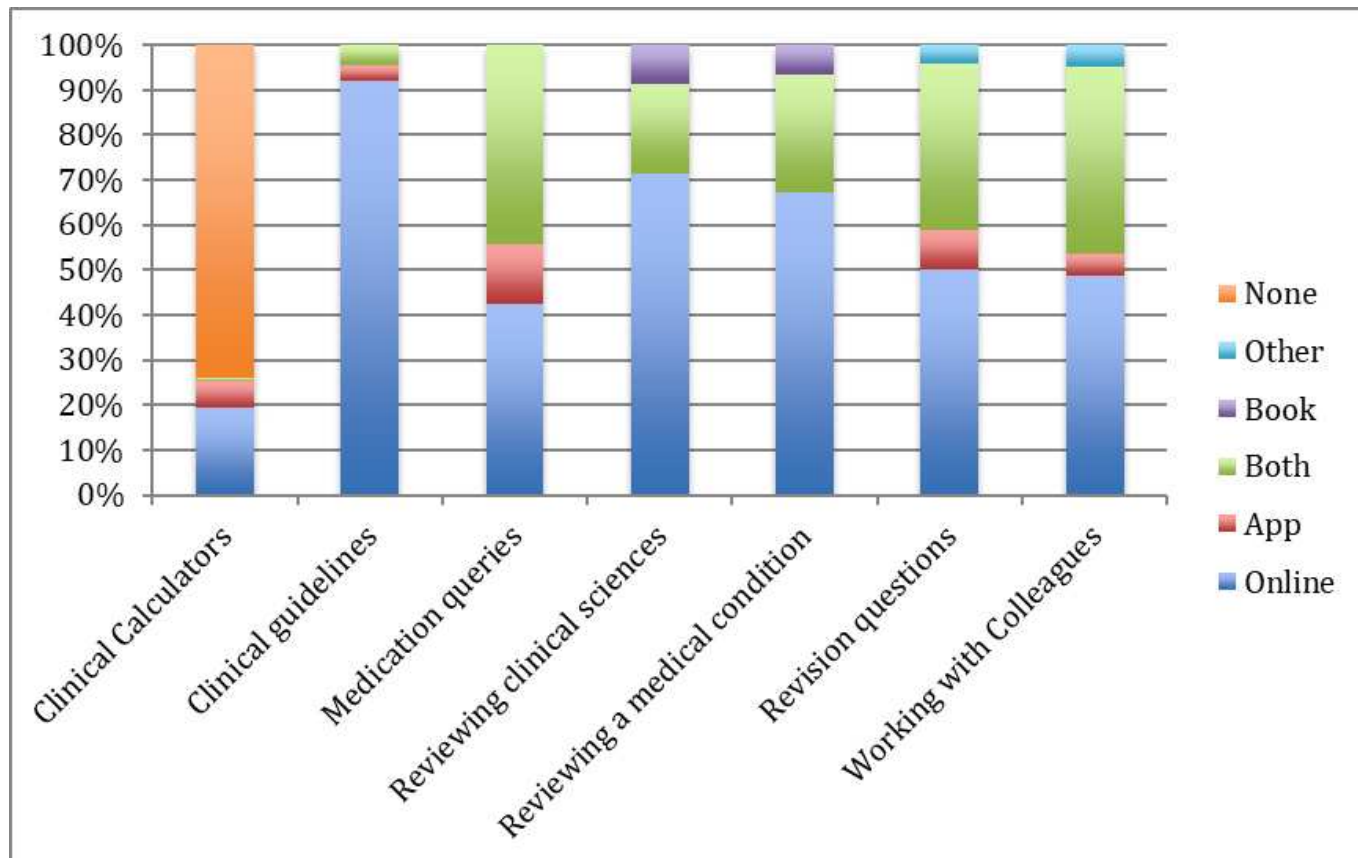
Figure 2 - The top used websites by students by number of citations



Students were asked to state how they accessed information in a number of situations that arise on clinical placements: clinical calculators, clinical guidelines, medication queries, reviewing clinical sciences, reviewing medical conditions, revision questions and working with colleagues. Additionally, they were asked whether they accessed this information online, via an app, via both the aforementioned or via a book.

Results show that most resources are accessed online however there is a large variety across the subgroups (Figure 3). Medication queries have a much higher app utilisation than other scenarios supporting the results that demonstrated the BNF was one of the most utilized apps. Within each subgroup, except reviewing clinical sciences, there was a clear favorite website or app. MDCalc was the preferred clinical calculator, NICE website the preferred guideline resource, the BNF the key medication query resource, patient info the preferred site for reviewing a medical conditions, Pass medicine the preferred site for revision and Facebook the preferred platform for interacting with colleagues. We would have to consider whether there was a lack of clarity from students about what was being referred to regarding working with colleagues as we are aware that use of WhatsApp and Facebook are high amongst students working in tutor groups yet the use of apps represented only a small proportion of the responses to this question.

Figure 3 – The use of different technologies for specific tasks



Students were asked to comment on whether they had been recommended resources by: their tutor, other clinicians, other students or whether they found them via an internet/app store search. The 94% of students had used resources that had been recommended by other students with only 40% having had them recommended by a tutor. Notably 64% used resources that they found via a simple Internet search, which calls in to question what level of critical appraisal they perform on new information. A question linked to this also asked how students ensured the accuracy and quality of the information that they were sourcing found that many then check the information in books. Whether this represents the fact that many still see textbooks as important with the electronic resources as a mobile support or whether it represents a lack of confidence in the electronic resources is difficult to conclude.

Students were asked when they used electronic resources majority of students use them before and after patient encounters rather than during suggesting they are using e-resources to either prepare to ask the correct questions or reviewing information after the clinical encounter.

Finally students were asked whether they had had any feedback during placements about their use of electronic resources. There was quite an even split between positive and negative feedback. The main areas of positive feedback seemed to be around speed of access to clinical information, for example drug information:

"The partners in my recent GP practice were impressed by my use of the BNF app and website, and one asked me to download the app on her smartphone."

Some students found that their supervisors were encouraging and suggested useful resources:

"lots of consultants happy for you to use smartphones for googling info while they dictate letters in clinic. One consultant encouraged it"

Lots of students commented that they perceived negative views and that it was considered to be rude to use a phone in front of a patient, even if it was for clinical information:

"many tutors are against pulling out your phone to e.g. look up a medicine but are fine with you pulling out a BNF but it's the same thing"

"Yes - I like to make notes on my iPhone (e.g. between patients in clinic or between patients on ward rounds) rather than writing them down on paper as they are more accessible here (same reason I use my iPhone calendar rather than a diary). However, I can sense negative attitudes towards this from some healthcare professionals."

Overall there was an overwhelming desire for supervisors to be more encouraging, for electronic device use to be more accepted and for faculty to recommend useful resources:

"It'd be nice if we could use electronic resources more on placement without being told off"

"should be more openly talked about, with good suggestions for resources from supervisors"

Discussion

The results demonstrate that the use of technology to support learning in the clinical environment is common amongst students. Our response sample also shows that all students have access to technology including 100% coverage of smartphone ownership. Despite this, and despite the fact that electronic resources to maintain knowledge and use as a reference is commonplace amongst clinicians, the use during the actual process of clinical consultation is low amongst our clinical students and, despite the access, it is clear that, based on our sample, not all students are utilising them. If we consider the comments made in response to our questions we have to ask whether this represents a failing of us as supervisors to provide leadership on this issue or whether existing perceptions on the use of these resources in the clinical environment is what provides the primary barrier.

It is important to note that the use of computers by General Practitioners has been common for many years. A very early study in the mid-1980s showed that it was the attitude of the clinician rather than the use of the computer that determined the patient perception of the encounter (Brownbridge, Herzmark and Wall, 1985). If we consider this a proxy for patient attitudes toward technology use it is clear that supervisors and students need to consider the way that they approach the whole process of the use of technology within the clinical environment in order to convey a more positive association to patients between use of technologies and both the learning and consultation processes.

Considering the level of technology ownership it is interesting to see that negative stereotypes continue to exist regarding the use of mobile devices to access clinical knowledge. The British National Formulary, as the most utilised app in our sample, is an interesting example. If we acknowledge the limit of memory, and indeed the risk of relying on memory for knowledge recall, then the use of a resource to ensure medicines management is both safe and appropriate seems entirely reasonable. Despite this the use of an application on a smartphone to access this information is clearly seen by our students to have a negative reaction amongst clinical supervisors whilst a book does not. This is despite the obvious ease, and speed of access, of information acquisition using the electronic device rather than the book, not to mention the benefits of carrying a much smaller device rather than a book of several times the size. This should be put into the context of high use of smartphones and apps for medically related information amongst both medical students and junior doctors previously noted in previous work in 2012 (Payne, Wharrad and Watts, 2012). It is interesting to note that a 2017 study noted that over 60% of patients would consider

the use of a mobile phone during the clinical encounter to be rude (Kerry *et al.*, 2017). It remains very clear that there is clearly a huge amount of patient education regarding the role of these mobile technologies still to be done.

The results suggest that the majority usage of electronic devices is after a clinical consultation to look up further information about a case and the data would suggest that this is relatively contemporaneous rather than later on in the evening. One student specifically commented on use of electronic devices as a note-keeping tool that applications such as Evernote or even simple e-notebooks could support. The advantage of many of these electronic tools is their ability to synchronise with desktop applications and thus form a useful repository of knowledge for the students learning. Despite this we again see a perceived negative attitude toward their use which is holding back the potential opportunities that these technologies provide.

It is clear that if we are to change the way that technology is used in the clinical placement environment we need to begin to target the clinical supervisors and engage them in the use of technology however we must also take patients with us on this journey as it is they who form the primary educational resource in the clinical environment.

In our opinion we need to address four key areas if we are to maximise the pedagogical benefits of technology in clinical placement.

1. We need to ensure that there is adequate wireless LAN coverage in clinical areas to support student use of technology. This is particularly acute in major hospitals as students are less likely to have access to their own computer. This is the single biggest facilitator to allowing us to promote the pedagogical opportunities these technologies provide.
2. We need to engage clinical supervisors in discussions regarding the use of technology in supporting teaching. This will mean the need to ensure that we educate the supervisors both in use of the technology that is available but also how to scrutinise and critique the content and support student engagement with it appropriately. In addition we should be actively promoting use of such resources in the training we deliver for supervisors including the Postgraduate Certificate in Medical Education. By embedding these technologies in tutor training we can start to create an atmosphere of empowerment around their use by both the supervisor and student groups ultimately benefitting both.
3. We need to engage all clinical staff who will have contact with students that the technology is being used for pedagogical purposes rather than more recreational ones. This may also open up opportunities for staff to feel empowered to utilise these technologies more openly to assist patient care in their working day. We must remember that in clinical placement education all staff have a potential role in the learning process so we must take them with us, not just the primary clinical supervisors.
4. We need to engage patients effectively in the discussion. If patients understand how technology is being used to benefit the student learning process it is our experience that most are very happy to engage with it. This is no different to the move from paper to computerisation that has been seen in primary care but it is clear that there is much work to be done to move the technologies, especially mobile ones, away from being seen as a barrier in effective consulting and to get patient acceptance of their role in ensuring safe and effective care.

Conclusion

Technology is now widespread and ubiquitous yet barriers still remain to support implementation and gain maximum benefit for pedagogical purposes. By undertaking this series of practice points, embedded within our departmental strategy, it is likely that we can improve the education offer and opportunities for our students in their clinical

placements. By taking the lead in the use of these technologies, through the education of our clinical supervisors and patients, we can shape the educational experience that they provide and ensure we deliver clinical education fit for the future for our students.

Take Home Messages

- We need to ensure that infrastructure is in place to promote the use of technology on placement
- Supervisors need to understand and support technology use by students in the clinical environment
- Clinical tutors need educating as to the pedagogical benefit of these mobile devices
- Patients need to understand how technology now facilitates pedagogy on placements

Notes On Contributors

Dr James Gray is Senior University Teacher at the University of Sheffield Course Director of the Physician Associate course at the University of Sheffield and director of the Physician Associate course. He is a General Practitioner at Meadowgreen Health Centre in Sheffield.

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Acknowledgements

The authors would like to acknowledge Dr Tim Herrick from the University of Sheffield School of Education for his support in developing this work.

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Appendices

None.

Declarations

The author has declared that there are no conflicts of interest.

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Ethics Statement

This project was supported through blanket ethics approval for School of Education Masters module projects at the University of Sheffield with tutor approval. All students were provided with participant information sheets and were required to give consent to take part as part of the data gathering process.

External Funding

This article has not had any External Funding

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