Title: Communication tools in the COVID-19 era and beyond which can optimise professional practice and patient care

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The BURST Research Collaborative comprises members and contributors around the world. Members utilise a number of communication tools to deliver high-quality international research projects, with face-to-face meetings only occurring on average twice a year. HR and DS are clinicians utilising other similar electronic platforms for both teaching and patient consultation use in the current climate. DS and VK conceived the initial idea for the article. KDC led the article writing in collaboration with all other authors. All authors critically revised the article and approved the final draft. KDC is the corresponding author and VK is the guarantor.

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We have read and understood BMJ policy on declaration of interests and have no relevant interests to declare.

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Licence

Optimising patient care and professional practice with communication tools in the COVID-19 era and beyond

Following the outbreak of the novel SARS-CoV-2 (COVID-19), the World Health Organization made a number of recommendations regarding the utilisation of healthcare services (1,2). A joint letter by the four Chief Medical Officers for the home nations and the General Medical Council (GMC) stated that organisations, employers and professional bodies should be "flexible in terms of their approach and the expectations of routine requirements" (3).

In general, there has been a reduction in elective healthcare services including outpatient clinics, diagnostic services and elective surgery (4). Inevitably these reductions for all but the most urgent clinical work will have a detrimental impact on patients, and alternative ways of working including the use of telemedicine may help to mitigate this. Similarly, electronic solutions may enable clinicians to maintain inter and intra-professional working in both clinical and academic settings.

Implementation of electronic solutions to minimise direct patient contact will be new to many clinicians, and the sheer number of software solutions available and varying functionality may be overwhelming to anyone unfamiliar with 'virtual communication'.

This article aims to review some of the ways in which online solutions may help maintain both clinical and academic work during the COVID-19 pandemic and beyond.

Remote Patient Consultation

Since the first documented medical telephone consultation in 1879 (5), telemedicine has gradually entered most forms of healthcare consultation. Specialties such as dermatology (6), cardiology (7) and orthopaedics (8) have utilised mobile applications and remote assessment for a number of years. The most recent NHS England Long Term Plan anticipates widespread use of online services within the next 5 years (9) including video consultations. These may replace face-to-face follow up consultations when appropriate, saving patients time, travel and cost.

COVID-19 has catalysed alternative working methods and telemedicine has rapidly taken centre stage. Applications of telemedicine include telemonitoring (signs or symptoms sent electronically from patient to provider in another location), remote interpretation of radiology

and other investigations, as well as consultations and departmental meetings via video conference (10).

Furthermore, telemedicine has been utilised in the COVID-19 pandemic through the triage, coordination and management of suspected or confirmed cases of the disease (11). Artificial intelligence allows the referral of moderate to high-risk patients to nurse triage while scheduling video visits with established or on-demand providers, avoiding travel and exposure. Theoretically, sicker patients could be identified at home and placed directly in hospital beds, bypassing the emergency department (12). A similar prognostication system for patients with sepsis (13) and those with critical illness in the intensive care unit (14) has previously been demonstrated.

The UK NHS 111 service was originally established with a view to triage patients online as a part of telemonitoring and is currently the first port of call during COVID-19, with over 400,000 phone call triages performed and the completion of over two million online symptom assessments (15).

Telemedicine has the additional advantage of maintaining the value of the workforce quarantined at home by allowing them to continue their scheduled outpatient visits as telephone and online consultations. This strategy depends on clinicians having reliable remote access to hospital records via an electronic system, and lack of such access represents one of the hurdles that needs to be overcome before telemedicine can be implemented more widely and consistently.

Several software applications have enabled the safe application of telemedicine to outpatient clinics; for example *Clinic.co* (free to those with an nhs.net email) (16) and *Attend Anywhere* (free trial followed by an annual subscription service) (17), which are purpose-built platforms for video consultations mimicking traditional clinics. *Clinic.co* provides a one-time link which can be forwarded to the patient's phone to access, at which point the video consultation starts. In *Attend Anywhere*, services are provided via a 'waiting area' representing a different specialty or service including primary care, consultant-led clinics or allied health professional services. Similarly, a virtual 'waiting room' allows patients to be aware of their number in the queue. No specialist software is required for either programme, as these are web-based and are fully end-to-end encrypted. Patients require access to an internet connection and a device that can allow video calling. The availability of services like these are increasing across the UK in multiple specialties, including in prison healthcare.

Software Security

The GMC Good Practice Guidance for patient care and safety, including confidentiality, applies regardless of whether patients are reviewed physically or electronically (18, 19). However, there are some specific considerations for telemedicine, particularly with regards to data protection (20). Today, electronic clinical interfaces are protected by higher tier security, and are designed with data security and confidentiality in mind (21). A number of safeguards are in place to ensure compliance with General Data Protection Regulation 2016/679 Guidelines and the Data Protection Act 2018 including data and email encryption, triple password protection, secure remote access 'tokens,' and limitation of the types of data stored (22,23).

Compromise to any of these measures can result in loss of data security, and subsequently patient confidentiality and trust. Whilst the GMC and medical defence unions have vowed to support doctors during the COVID-19 pandemic (24,25), clinicians must remain cognisant of the heightened risks to data security with ongoing use of telemedicine in the future. Accordingly, clinicians and medical indemnity companies should ensure that clinical indemnity cover includes telemedicine in all its formats. In terms of communication tools, Microsoft Teams has recently been implemented free of charge across the NHS for a limited time period during the COVID-19 pandemic and is therefore protected and monitored by the NHS Secure Boundary, ensuring that patient data and clinical services are robustly secure.

Practical Considerations and Patient Care

Telephone consultations are technologically more straightforward than video consultations but are limited by the lack of visual cues and the inability to show patients radiological images or drawings to complement discussions. Video consultations overcome these drawbacks, but at the cost of greater technical complexity, including issues surrounding the patients access to appropriate technology to support the consultation. Appropriate preparation is essential in scheduling and allocating patients to this method of communication (see **Box 1**).

To ensure telemedicine stays relevant in healthcare even after the COVID-19 pandemic, it is essential to introduce dedicated training of clinicians specifically for remote consultations. A recent review examining published curricula for telemedicine (26) highlighted that this may be provided using well developed, comprehensive curricula in both undergraduate and postgraduate training within the contexts of commonly utilised frameworks such as the CanMEDS roles (27) and ACGME Core Competencies (28). The review found that the most frequently taught topics in telemedicine curricula were the use of technology, performing

clinical examination and history taking via telemedicine, communication with patients and specific topics specific to medical specialties. The authors concluded that a comprehensive telemedicine curriculum based upon a competency-based, outcomes-orientated framework was required. Another paper assessing the utility of a telemedicine specific teaching class for new surgical residents in the USA found that students had increased confidence in target communication skills and that direct observation and immediate faculty feedback were particularly useful for students' confidence in performing telemedicine consultations (29).

Another important consideration is that of the patient experience in utilising telemedicine and video consultations. The acceptance of these new technologies by patients as well as clinicians is key to its' success in the future. Patients will require adequate training and documentation provided on how to use the software being utilised. They may be apprehensive regarding the lack of face-to-face communication and therefore have perceived difficulties in communicating their concerns and issues. It is likely that acceptability of telemedicine consultations will increase over time as they're increasingly employed. Furthermore, knowledge and awareness of in which situations telemedicine may not be appropriate is key for clinicians. Situations such as those in which a patient does not have access to appropriate technology or there are other difficulties present such as patients who are hard of hearing or the need for clinical examination must be anticipated and triaged appropriately to ensure clinical care is not compromised.

Box 1: The 7 Ps for a successful virtual clinic

Practice	Ensure familiarity with the system, both the clinical applications and communication tools, especially if working off-site in advance of your first clinic. Check audiovisual equipment is working before initiating any consultations.
Patient-centred	Decide whether the consultation will be audio only or with video conferencing, and send information / instructions in advance about what to expect from the consultation (including the time, date and duration). Confirm that the patent is able to speak confidentially and that they are comfortable using the technology/device chosen for their consultation.

Professional	Find a suitable quiet space (particularly if consulting from home) to avoid disturbances and maintain patient confidentiality. If examination is absolutely necessary (either live video or via picture messaging) explain the need clearly, recheck consent and preserve dignity. Be aware that some applications (including the patient's) may allow the recording of consultations.
Plan and Prepare	Review the patient's file in detail before the consultation to anticipate issues including any difficult discussions or language barriers (although it may be possible to include an interpreter in a 3-way call). It may be necessary to make alternative arrangements, including changing to an 'in-person' consultation depending on circumstance.
Perform the consultation	Devise methods of denoting that a patient is about to be contacted by you to avoid two clinicians in the same virtual clinic ringing the same patient. Set expectations with the patient at the start of the consultation. Headphones are helpful to avoid feedback. A screen-sharing option is useful to show scans. Decide how many times to call the patient if unable to connect first time and consider options for leaving a message on an answerphone. In particular, avoid identifiable or sensitive information if the answerphone is not personalised (and therefore the possibility of a wrong number).
Perfect	It takes time to learn how to set up a virtual clinic and do it well; consultations early in the learning curve are likely to take longer than with experience. Perfect methods of eliciting patients' ideas, concerns and expectations and methods to summarise the plan and draw the consultation to a close. Reflect on the process and get feedback from colleagues and patients to improve the process in the future.

Precision	Document the consultation in equivalent fashion to an 'in-person' consultation including letter dictation and arranging follow up tests / appointments. State that the consultation occurred remotely and explain why.

Virtual Team Working

The other area in which online solutions have come to the fore during the COVID-19 pandemic is in enabling inter and intra-professional teams to work together successfully, even if doing so remotely. Central to this paradigm is the use of software platforms which enable efficient team organisation and communication that can be thought of as '*anchor software'.* Anchor software acts as a central hub and messenger which can link other software tools to allow features such as video conferencing, document editing and task scheduling. Functions such as inter-team messaging, task reminders and links to cloud data storage for document sharing provide additional utility over-and-above existing phone calls, text messages or email. Furthermore, these systems allow multiple people to join discussions from separate locations including across sites or institutions (**Figure 1**).

Figure 1: Utility and functions of various anchor software

Anchor software systems each have unique characteristics and selling points which influence the choice of one application over another. Ideally, all platforms should be compatible with desktop, laptop and mobile use, allow messenger communication, and enable task allocation including management of deadlines.

Examples of anchor software include Slack communication software, Microsoft Teams, Asana collaboration work management platform, Monday and Teamwork. Of these, Slack and Microsoft Teams are two of the leading platforms sharing functions such as free file storage and the ability to subdivide teams into separate groups of people working on specific projects.

However, there are also key differences between these systems and a number of advantages in using them over traditional forms of communication (**Box 2**). Microsoft Teams is primarily designed to work with Microsoft-based applications such as Office, Outlook and Meetings. The majority of key functions are embedded within the platform so once installed users should

be able to perform the usual functions without installing additional software. Conversely, Slack allows integration with a wider variety of third-party applications which may allow a more bespoke system that can be built-up to suit the particular needs of an individual team. Many basic functions of add-on third party applications are free.

Box 2: Comparison of 'current practice' (Separate Email, Phone, Text, Whatsapp) to the advantages of communication via an Anchor platform with Slack as an example of a system with 'customisable bolt-ons' and MS Teams as an example of an 'all in one' system, where all functions are embedded within a single application.

Function	**Current Practice (Smartphone or tablet)**	**Slack**	**Microsoft Teams**
Cost	Essentially free, with most individuals already possessing a device enabling texting, calls and Whatsapp messaging.	Free plan with options for upgrades depending on needs.	Free limited plan for healthcare staff granted during COVID-19 pandemic with options for upgrades depending on needs. The most recent version may be available through institutional or university access. Longer-term access rights healthcare staff will have after COVID-19 pandemic is complete has not been confirmed.
Central Messaging /	Limited to group text, email or Whatsapp messages.	Can assign tasks from within documents or chat	Central messaging from within Teams. Threads, private

Assigning Tasks		‘threads’. Private messaging available. Can provide deadlines and reminders to individuals or teams from a single message. Advanced notification system which can be altered.	messaging and group channels available. Heavily customisable messages such as the use of bullet points and altered fonts. Requires a third-party app download to set reminders / tasks.
Subgroup Threads / Channels	Not available. Can lead to difficulty in ensuring focus of different members of the team on different projects.	Can create work threads to allow only those with a particular interest or task on a project to receive notifications, thereby avoiding spam.	Can create work threads to allow only those with a particular interest or task on a project to receive notifications, thereby avoiding spam.
Document Addition	Necessary to be accessed through email. No group ability to edit documents in real time or collectively. Can be challenging to find documents in an email account amongst the many emails being received. Individuals within a team make comments and edits to a document offline, unable to see in real-time the	Collaborative document editing in real-time using Google Docs allows co-editing in real-time. Can link documents to particular channels so that it’s easier to find them.	Utilises Microsoft Office 365 e.g. Word/Excel and allows co-editing in real-time. Can link documents to particular channels so that it’s easier to find them.

	suggestions made by colleagues.		
Calendar / Deadlines	Limited to individual or personal calendars only. Requires each individual to manually add these to their calendar.	Can be combined with Google Calendars or Gmail to send reminders and shared calendar invites directly to individuals in the team.	Integrated with Microsoft Outlook and Outlook Calendar. Can be used to send reminders and shared calendar invites directly to individuals in the team.
Project Management	None. Challenging to coordinate a team and maintain oversight of overall productivity towards a team's main goals.	Free third-party application additions such as Trello allow oversight of teams productivity.	Can use Microsoft Planner or a more limited number of external third-party apps allow oversight of teams' productivity.

Messaging within Microsoft Teams and Slack allows work-stream specific conversations to be established. This avoids contacting the whole group with every communication and helps to ensure messages reach the right audience in the most timely manner. Individual posts can spawn "threads" so that multiple discussion topics within a work stream can be better organised.

The use of anchoring software and accompanying project management and communication software can facilitate the following examples of team working.

MDTs and Departmental Meetings

With the centralisation of cancer services, remote multidisciplinary team meeting (MDT) functionality is already relatively widespread. However, this commonly takes place between sites and the current COVID-19 situation may not allow a large number of people to be in the

same room at the same time at each individual site. Video conferencing should be arranged in a similar manner to a face-to-face meeting, with a central coordinator organising an appropriate meeting time and 'place' (in this instance, organising and distributing a link that others can join with). Electronic records enable simultaneous access of relevant medical history, imaging and other investigation results during a remote MDT by each specialty or clinician. This has the potential for improved decision making as each individual has access to all the clinical data rather than the more standard process whereby only a brief summary is usually presented to the MDT.

Prior to the meeting the coordinator should test the software to ensure any technical issues are rectified. During video conferencing, it is important to mute all non-speaking participants to prevent them speaking over one another especially when it is difficult to signal to the moderator. During the call, all participants should ideally use headphones to prevent speaker 'echo'. Participants can also use the messaging feature within the video conferencing app to signal comments or questions thereby minimising interruptions. Participants should ensure good lighting, a plain background and as little noise as possible to avoid distractions.

Academia, Project Management and Document Editing

Academic departments and research collaboratives have been required to alter their practice during the COVID-19 pandemic due to restrictions on face-to-face working, which could impact on research productivity. Being able to collaborate in a shared space will help maintain research activity. Anchor platforms and their associated software applications can provide a forum for project-specific discussions amongst research groups and allow certain activities to continue. With the exception of most lab-based research, many research activities typically carried out in person can be carried out using these software, allowing important projects to be completed, manuscripts to be written and grant applications to be submitted.

Perhaps the most important function within anchor software is the integration of collaborative document creation and editing. Documents can be attached or 'pinned' into the relevant chat stream allowing a central version of the document which team members can edit and collaborate on with individual team member changes visible as they occur in real time. Aspects of the document requiring specific input can be set as tasks for the relevant team member to identify and complete within the document.

Teams can thus be convened in the virtual space and allow projects and tasks to be managed with lists, assignees and deadlines. There are multiple task management software

applications that can be added to Slack (e.g. ToDo, Sendtask) without a cost, which allows project coordinators to manage collaborators more effectively. Trello is a project management software programme integrating with both Slack and Microsoft Teams, and although full Gannt chart functionality (a bar chart illustrating a project schedule and progress) requires a fee, basic functions are adequate for most small teams. Project management software allows an overview of tasks that need completion, who is assigned to complete them and the timeline for completion.

Key messages

1. The move towards telemedicine and remote team working is not only essential in the current climate but can improve efficiency in clinical and academic practice
2. Appropriate introduction and training of the team on the chosen software platform is needed. A step-by-step approach could involve starting with messaging within channels, then video MDTs before using the technology for patient-facing communication.
3. Prepare technology and allocate an appropriate time and space for video consultations and MDTs. Define and maintain online etiquette including silence mode when not speaking.
4. Beyond the COVID-19 pandemic, analysis of the costs of establishing this technology (including an electronic record), staff training and any loss of income from direct consultations must be balanced against the benefits in time and cost saved to the patient, including improved use of resources focused on ‘in-person’ patient interaction when it is most needed.

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