Challenges and Solutions to Deployment of Internet Videoconferencing for Researchers and Clinicians in Primary Care Medical Settings

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Abstract

Advanced internet videoconferencing software and improving network connectivity have the potential to create high quality collaboration environments among clinical trial researchers and health care providers at primary care medical settings. However, site policy and support restrictions have limited the ability of medical researchers to benefit from these advances. Novel combinations of existing open source solutions hold promise for overcoming barriers to adoption. Simplified installation, configuration, and operation of videoconferencing will further assist medical research.

Introduction

Creating new approaches to clinic based randomized controlled trials (RCT’s) requires the effective development of policies and processes and the information systems to implement them. Frequent and productive group interaction ensures that common goals are identified, planning and designs are consistent with the goals, and construction activities are in line with the designs and plans. Often widely geographically distributed experts from a variety of knowledge areas contribute to the effort.

To bring key personnel together in a virtual environment that will allow free and clear exchange of ideas, several criteria should be established for the evaluation of video conferencing tools. Beyond the quality of sound and video, the ability to easily share documents and support presentations must be considered. At each participant’s site, local conditions may limit contribution to a meeting. Some sites have barriers that thoroughly prevent involvement until they are addressed. Network security measures, restrictions on making local changes to systems, and lack of suitable systems and peripherals are common difficulties. Several approaches exist to overcome these challenges.

Requirements, Obstacles and Solutions

In any teleconference session, the highest possible quality audio is desirable. Far superior audio bandwidth and dynamic range using internet-based products are possible than what standard telephone technology can offer. Video closely synchronized with audio is vital for providing visual cues that add to dialogue. Media generated and consumed by multiple sites is best distributed over udp, multicast enabled networks. For each participant, eliminating the distinction as a presenter or audience member will give all the equal and immediate ability to speak as well as listen, which supports interjection when it is needed. Built-in data sharing tools should be available to avoid dependence on other modes of information exchange (i.e. email, file servers) and the delays inherent in them. High or full screen resolution presentation and application sharing tools further the ability of simultaneous group comprehension and consensus.

Using open source components, the AccessGrid ToolKit (AGTK) is one of the packages that address these needs and meets the criteria. It achieves this by providing several media modules, sharing tools and a user interface to coordinate these. Rather than using dedicated hardware, the AGTK can operate on systems found on the desks in many offices once they are equipped with web cameras and microphones.

Specific barriers include the presence of firewalls, network address translation (NAT), and controls of administrative rights on systems. Network bandwidth limitations impose additional constraints.

Combining open source ssl vpn software with the AGTK has resolved connectivity issues in most cases. By tuning the media tools of the AGTK, bandwidth demands can usually be adjust to stay within limitations. Joining sessions with only media is an option for some sites with installation restrictions.

The separate open source applications need to be combined in a single application to achieve simplified installation. Automating tuning of parameters will ease operation of the applications.

Conclusion

As continued work in clinical trials takes place in actual clinical settings, carefully combined and configured open source internet video conferencing tools may provide valuable support in this highly collaborative activity.