

Sauerbruch, STARPAHC, and SARS: Historical Perspectives on Telemedicine

Telemedicine is by no means an intervention of the 21st century, but has roots that go back thousands of years ago to the use of bonfires to warn other villages of diseases (Bashshur & Shannon, 2009). In a broader sense, telemedicine can be understood as “the conveyance of health information using the best technology available” (Hurst, 2016, p. 176), always with the final means to bring cure to those in need of it (Sood et al., 2007). With telemedicine being such a historic concept, looking into the past can provide important insights for its successful implementation in the present.

Thus, our study aims to scrutinize selective historical cases of telemedicine use and compare them with current projects. This will help to understand the generic concept of readiness throughout the centuries, as well as the understanding of the broad categories of enablers and barriers of telemedicine (Harst et al., 2019). In addition, the study provides the opportunity to apply the Telemedicine Community Readiness Model (TCRM), developed within the research group Care4Saxony, to three selected historic use cases.

The term telemedicine is defined as health care delivery and/or medical education either between health professionals and patients or among the health professionals involved that overcome (geographical) distances by using information and communication technologies (Otto et al., 2020). Following this definition, we look at historical and current projects that describe telemedicine initiatives. Thus, as suitable case studies, we selected:

- (1) Sauerbruch, a surgeon at the Charité in the 1940s, who communicated intensively via letters and telephone about the treatment of individual patients (Sauerbruch, 1960) as an historical example of teleconsultation.
- (2) The National Aeronautics and Space Administration (NASA)'s telemedical projects between 1960 and 1990 (Simpson, 2013) including the STARPAHC (Space Technology Applied to Rural Papago Advanced Health Care) project (Freiburger, Holcomb, & Piper, 2007) as an example that overcame very long distances.
- (3) The use of telemedicine during previous SARS, MERS, and Ebola outbreaks (between 2000 and 2016) as examples of telemedicine in epidemic situations (Chang, Lee, & Wu, 2004; Keshvardoost, Bahaadinbeigy, & Fatehi, 2020; Lee, Lee, & Kim, 2015; Ohannessian, 2015).

The historical documents of these case studies will be coded according to readiness perspectives of telemedicine (Otto, Whitehouse, & Schlieter, 2019) as well as to common barrier categories for telemedicine implementation (Otto & Harst, 2019). While the TCRM provides a checklist of criteria to define the maturity level of telemedicine projects (such as the involvement of community members and the proliferation of an adequate workforce), the systemization of barriers helps to identify common pitfalls of telemedicine projects in three broad categories, namely people, process and object-related barriers. With the barriers being included into the TCRM, the model is prescriptive in so far as it helps to overcome barriers to successful implementation.

First results indicate that especially core readiness as a necessary prerequisite to any form of maturity can be achieved rather quickly in cases of emergency and barriers can be overcome with sufficient financial, organizational and technological resources. Core readiness seems to be easily achieved in projects without alternatives for face-to-face medical treatment.

This is also confirmed, when we look at current examples of telemedicine, such as healthcare provision in remote areas in Australia (The University of Queensland, 2020), the use of telemedicine in the recent SARS-Covid19 pandemic (Keshvardoost et al., 2020) or up-and-running teleconsultation networks, e.g. emergency stroke units. Beyond these case studies and looking at similar projects in the long history of telemedicine, we can conclude from this historical perspective that problems in health care delivery have in all times stimulated innovative technological and communicational means, and strategies to deliver healthcare services over distance (Sood et al., 2007).

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