

Assembling Goal Attainment and Collaboration Videoconference in Clinical Practice

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Abstract - Videoconferencing (VC) for clinical work at scale is underway at the University Hospital of North Norway (UNN) as a strategy to support the goals of integrated and coordinated care pathways and reduce secondary health care costs. A research project: “Modelling Videoconference Collaboration” was designed to investigate financial and social aspects following this development. The project primarily looks at collaboration between clinicians. This paper reports on the sociological aspects of the project where the overall objective is to explore emerging new models for clinical VC collaboration and analyze specified mechanisms involved in optimizing the potential of the service. In the paper I report results on the question: what theoretical resources are useful for addressing processes towards goal attainment and VC practices of collaboration? Based upon a review of scientific publications, policy documents and theoretical work, a summary of experiences with VC use in Norway is presented to identify results on goal attainment and collaboration practices. International findings are also briefly considered. Complexities concerning influences and goals were identified. This result is used to introduce and discuss theoretical approaches, arriving at the concept of assemblage for addressing complexity. Arguing for the use of this concept, the paper concludes with operational questions for further empirical exploration and analyses.

Keywords-video-conference; goal attainment; clinical practice; collaboration and integration of care; theoretical resources

I. INTRODUCTION

Videoconferencing (VC) for clinical work as part of telemedicine services has been used at the University Hospital of North Norway (UNN) for approximately 25 years [1]. During the last 5 years, measures to develop VC use at scale have been taken on as a strategy both to support the goals of more integrated and coordinated care pathways and reduce secondary health care costs [2].

The research project: “Modelling Videoconference Collaboration”, ongoing 2013 and 2014, is designed to investigate processes and outcomes through multi-methodological approaches, including quantitative and qualitative methods. The overall objectives are to explore emerging new models for clinical VC collaboration and to analyze active mechanisms involved in optimizing the potential of the service, that is: the process of goal attainment. One half of the project addresses economic models and the other, which this paper derives from, examines socio-material models.

In sociology, determining theoretical positions and resources normally form large portions of projects. Basic assumptions, research questions, analytical approaches and concepts are considered to be intertwined and parts of the production of results. Therefore, the first aim was to determine theoretical resources and specify analytical concepts. In the paper I present and discuss responses to the question: What theoretical resources are useful for addressing processes towards goal attainment and VC practices of collaboration?

The resources are to be used for investigations and analyses of active mechanisms involved in goal attainment and collaborative processes, and to conceptualize socio-material models of optimization of potential. This aim will involve empirical studies of ways collaboration and integration of care are co-produced, and made viable and sustainable in specific practices where videoconference is used.

The paper is organized as follows: First, a section on methods and data for the theoretical considerations in this paper is presented. The following results section includes a presentation of published material on videoconferences, use, plans and anticipations in Norway, focusing on goal attainment and collaboration. Considering the results, theoretical approaches are then presented. I propose a concept of assemblages as a response to the findings of complexity of influences and goals in the research literature and documents. The discussion section addresses two questions: 1) how can goal attainment using information and communication technologies (ICTs) in health care be addressed? And 2) how can collaboration and integration of

care be addressed? The paper concludes with questions and hypotheses for future work as well as data sources for the analyses of mechanisms and models for goal attainment, including collaboration.

II. METHODS AND DATA

The methods and data sources used for the sociological project reported here are as follows.

- Addressing Norwegian experiences, documents from the Regional Authorities of Helse Nord on videoconference use and priorities from 2005 were studied.
- A literature search was performed through Google Scholar using the terms “videoconference in clinical practice in Norway” and “videoconference use at UNN”. Selection criteria were peer reviewed international publications reporting experiences from utilization of telemedicine including VC, dating from 2005 onwards. Papers with a focus on priorities, goal attainment and collaboration were included. Full text papers were retrieved and studied.
- Recent Norwegian government documents on health care reforms were studied, focusing on integration, collaboration and use of ICT’s in health care.
- Peer reviewed scientific papers commenting on recent Norwegian reforms were studied.
- A literature search using PubMed was performed with the search term: “systematic review of use of videoconference in clinical practice”. Reviews addressing videoconference, collaboration and goal attainment were selected, retrieved and studied.
- The main focus in this paper is on developing theoretical resources and concepts. A selection of work on processes of utilization, collaboration and governing of ICT’s in innovation within the body of complexity studies was considered. This selection was substantiated through relevance for the subject area under study as argued in the paper.

III. RESULTS

In the results section, I present videoconference, its use in Norway, plans and assumptions as well as published results on goal attainment and collaboration.

A. Video conference definition and use

Although, in simple terms telemedicine refers to the delivery of medical and health services at a distance, there is no single or uniform telemedicine application. Telemedicine pertains to a dimension of distance that is bridged with the help of communications technologies, from Plain Old Telephone System (POTS) to satellite communications, ICT and networking technologies, such as the Internet, and the Global System for Mobile Communications (GSM) [3].

Video conference includes different technologies [4-6] making it a tool for collaboration between colleagues, education and remote patient consultation. Videoconference for clinical use is a synchronous service, indicating discussion of clinical questions with real time use of text, images, and video of the patient or wherever the patient may be present. The project I report on has its main focus on collegial collaboration. VC has undergone vast development, and today mobile units may be utilized by doctors for collegial discussion along with traditional VC studios or lecture halls equipped with large screens. The videoconference concept itself might be under pressure as technologies and use situations evolve [4].

In late 2005, the Northern Norway Regional Health Authority requested an evaluation of all tested telemedicine services in northern Norway to clarify which were suitable for large scale implementation. They developed a priority list of medical specialties and topics.

The first tier priorities were teleradiology, digital communication and integration of patient records, and education. The second priorities were teledialysis, pre-hospital thrombolysis, telepsychiatry and teledermatology. The third priorities were pediatrics, district medical centers, tele-ophthalmology and tele-otorhinolaryngology. VC was one type of service discussed.

In 2011, a report on the use and potential for videoconferencing in Helse Nord was commissioned as an internal report. The report concluded that there is great potential for the scale and nature of videoconferencing to increase. The recommendations were on pragmatic and operational levels and included the establishment of a new in-house organization to lead future videoconferencing, probably requiring specific expertise and resources to be bought in from outside companies. Rejuvenating the infrastructure, providing a well-resourced Service and Support Centre and increasing future involvement of clinical staff at UNN was also proposed. Strategic support at senior level in the University Hospital was also considered essential if the vision of future widespread use of videoconferencing for health care was to be realized.

Two different kinds of clinical videoconference were described as possible concerning inpatients and outpatients. Examples of the former include staff consultations about patients who have been discharged from the main hospitals to the regional and local levels. Following discharge, hospital staff could carry out regular case conferences with local staff to ensure proper follow-up. This does not take place on any scale at present; however, some outpatient video consultation already does take place including activity in dermatology, orthopedics and surgery, especially with stoma.

The report described considerable potential in outpatient follow-up by videoconference. For example, there were approximately 115,000 outpatient visits to the UNN per year. By supposing that one-quarter were from remote areas where videoconferencing would be preferable to travel, and

that one-quarter of these appointments were suitable for videoconferencing (e.g. follow-up or "outpatient control"), this would represent an additional 7000 conferences per year, i.e. this would double the present number of videoconferences, and would increase the number of patient consultations by about ten times. Considering the latter as a hypothetical statement, I will address experiences from Norway when it comes to optimizing potentials next. Are operational and pragmatic strategies considered successful?

B. Goal attainment: experiences

Three papers have commented directly on different conditions for goal attainment understood as increased use of ICT's in health care for Norwegian services.

In psychiatry for instance, videoconferencing was mostly used for meetings, supervision and lectures, and to a lesser degree clinically with the patient present. Lack of videoconferencing equipment in collaborating institutions was identified as an inhibiting factor in use. A gap between the potential of videoconferencing and its actual utilization in Norway's mental health sector was described [7].

One paper accentuated user support, training, research potential, financial incentives and interactions between clinicians and ICT personnel as important factors in motivating health-care personnel to use telemedicine [8].

In another paper, factors for successful implementation were: usability, user participation, adequacy of training, potential for research, stated requirements for Mean Time Between Failures (MTBF) and communication between ICT personnel and clinicians [1].

C. Collaboration

Motivation and good communicative interaction between ICT personnel and clinicians were among the identified heterogeneous conditions for use. The Norwegian health care system is considered well-organized within its two main sectors; primary health and long-term care on one hand, and hospitals and specialist services on the other. However, the relationship between them lacks mediating structures. In 2003, the work of a governmental committee on collaboration was commented upon by Romøren et al [9]. The committee was described as having a sharp eye for the power game between primary and secondary health care, with the latter as the stronger. Their report argued for equalization as an important prerequisite for developing sound collaboration and coordination, and against primary economic or organizational reforms as effective means to optimize potentials in co-ordination and collaboration.

The new health care reform, the Coordination Reform, is one initiative to ensure high quality services across sectors and between health care levels [2]. The Coordination Reform represents a shift in perspective away from the operational to the administrative level and appeals to the need for economic or organizational reforms in order to

foster collaboration and quality. The reform also represents a shift towards a focus on collective goal attainment, for instance via care pathways, as opposed to internal goal attainment for specific sections or institutions of health care.

In sum, goals of collaboration between the different sectors of health care, including strategies ranging from technological, operational, administrative, economic and organizational reforms were described, as well as challenges thereof. Active mechanisms for collaboration between different professionals and institutions will be further explored and conceptualized in the remaining phases of the project.

Collaboration between colleagues within the same profession and institution could prove to be parts of another conceptual model. Since the 1960s, substantial development in the uses of video-conferencing (VC) among medical personnel has been reported, including surgeons who have adopted the technology [10]. VC is widely used for telementoring surgical procedures and in trauma and emergency medicine. VC is also used by multidisciplinary teams and for the follow-up of patients after surgery. VC is considered a common clinical tool for surgeons, providing a great opportunity to alter surgical practice and to offer patients the best expertise despite especially great distances in rural areas.

A systematic review of inter professional collaboration (IPC) in health care reported that videoconferencing compared to audio conferencing in multidisciplinary case conferences showed mixed results. More rigorous, cluster randomized studies with an explicit focus on IPC and its measurement, were suggested to provide better evidence of the impact of practice-based IPC interventions on professional practice and healthcare outcomes. Studies should include qualitative methods to provide insight into how the interventions affect collaboration and how improved collaboration contributes to changes in outcomes [11].

IV. DISCUSSION

1) How can goal attainment, using ICTs in health care be addressed? 2) How can collaboration and integration of care be addressed? As evident, the three papers discussing goal attainment consider use of telemedicine as a success in itself, and the authors discuss conditions for obtaining more use. Use is a necessary condition for goal attainment. Taken together, coordination, collaboration, ICTs, economic incentives, power relations, organizational reforms and motivation were suggested as influencing use and goal attainment. These are highly heterogeneous influences.

In addition, collaboration and coordination seem to be considered both conditions for use and as parts of the goal. The impression from publications is that goal attainment and collaboration is intertwined, dependent parts of a complex array of factors, actors and relations, ranging from micro processes to overall political and economic decisions. In the next section theoretical resources are proposed and

discussed for approaching and making sense of such complex arrays of factors influencing use of VC in health care and better collaboration for goal attainment. For this purpose, the concept of assemblage is explored after a short introduction to basic assumptions about ICTs and goal attainment within different theoretical perspectives.

A. *Basic assumptions in the studied literature: ICTs and goal attainment*

“Integrated care” and “improved patient pathways” are two main goals set by political priority through the Coordination Reform. These goals include operational, technological, organizational and economic regulations to foster collaboration and integration. Videoconference in different technological versions is one of the tools considered.

How clinical VC can contribute or be a means to achieve the goals involves complex processes. Processes of use, innovation and improvement have been considered with different basic assumptions of the roles and power of ICTs, their protocols and software standards:

- Information and communication technologies have become considered an institution into themselves by producing cognitive, normative and regulative effects in specific domains [12]. This view is stemming from Roger’s ideas about diffusion of innovations first published in the 1960’s [13]. This is a determinist view of technologies.
- Information and communication technologies have conversely been considered as both used and produced through and by the meaning that actors attribute to them in daily practices [14]. These are the social constructivist views, also pointing to individual actors or groups of actors and their motivations for use.
- Information and communication technologies have also been considered tools used by authorities or industry for governing behavior and institutions [15]. These are the instrumentalist views of ICTs.

B. *Assemblages*

In the papers reporting experiences and the policy documents referred to above, ICTs are considered with partly contradictory assumptions according to the perspectives outlined above. According to the policy documents, they are described as one of many factors instrumentally influencing goals, as having inherent regulatory effects and as strategic instruments. A body of research different from the determinist, social constructivist and instrumentalist views, has developed a terminology to address such complexity.

Some main characteristics from this body of research are described below, and their relevance for the empirical study to follow will then be discussed.

In this body of research, ICTs are described as one influence in heterogeneous and dynamic assemblages

stretching from micro to macro, gaining power to influence goal attainment in ever changing constellations. Power is considered to be an empirical question in such assemblages, resulting from ongoing transparent negotiations, subtle power games and/or material, mental or scientific resource allocation [16-19].

Assemblages comprise in various mixes and connections a plethora of actors such as professionals, political authorities, technical agencies, bureaucratic organizations, ICT providers, service firms, regulatory bodies, software engineering companies, and research centers, together with the technical, functional and normative components with which they run their transactions. In different and unpredictable manners, these influence the faith of goals. All these actors are subject to being strengthened, disappearing or changing due to the processes.

An assemblage constitutes a loosely structured, ever evolving ecology of heterogeneous elements where boundaries and linkages among administrative bodies cannot be unequivocally fixed, tending to shift and drift in time. Assemblages are always ad hoc, thereby needing constant re-conceptualization. What seems to emerge as a distinctive feature of this institutional ecology is that coordination and execution of tasks are equally dependent on formal, normatively-based authority structures and on functional linkages and communication standards and protocols. The overall functioning of assemblages and the viability of the ecology itself are based as much on communications and functional relations as authority and norms [16].

The regulatory and enforcement capabilities are thus considered to be equally embodied in formal laws and regulations, and into technical standards and devices brought about by the technology, while the share of the latter pair is constantly growing. The combination of technical standards and software codes with bureaucratic procedures and legal codes give rise to novel institutional arrangements and practices, where ICTs increasingly provide the implicit context for the performance of practices and the overall operation of the administrative agencies. One of the visible consequences is that normativity gets disaggregated into specialized sub-assemblages [17]. Control over goal attainment is therefore an ongoing achievement and not predictable.

These assumptions and concepts are underlying an approach to scientific inquiry submerged under the broad category of complexity studies in which the ways individual roles, groups and organizations emerge, evolve and adapt to their environment are studied [20].

C. *Assemblages for studying goal attainment and collaboration for integration of care*

Formative and naturalistic methodologies that acknowledge telemedicine as an ongoing collaborative achievement have been recommended for assessments [21].

Such approaches engage with stakeholders, including patients to produce and conceptualize new and effective telemedicine innovations. How may collaborating clinicians and patients be attended to in assemblages? Motivation was considered an important condition for use and this subject area will be addressed in the continued project. In recent social science work, the force and power of individual actors' evaluative relations to their daily activities has been highlighted [22]. Efforts to define and make professional excellence viable are considered to provide the emotional energy necessary to support and domesticate positive innovations. Involvement by clinical staff, motivation and communication were considered as important conditions for use, and are also inherent to the goal.

From the discussion above, the research questions for the second part of the sociological project can be more precisely defined: How are operational, technological, organizational and economic regulations, standards and reforms accommodated and reconfigured in daily collaboration using VC in clinical practices to obtain goals? How are improvements understood?

In order to analyze mechanisms, the project will more specifically consider:

- Which actors and factors make up the practices?
- What are their motives?
- What and who are enrolled?
- What and who are excluded and why?
- Which support is gained from what/who?
- What opposition is encountered from whom/what?
- What is changed and how are new models of VC collaboration enacted?
- How are goals of collaboration and integration of care understood and conceptualized?

By including accommodation in the question, the roles of individual actors, their knowledge and philosophies are acknowledged. These may vary between different actors and institutions. The research project therefore also addresses challenges and solutions of a philosophical character. Goals might be differently understood and the project will take into consideration different opinions and constructs.

A few challenges concerning collaboration and quality goals are briefly considered here. By looking at the combination of operational, strategic, motivational and material influences, the questions asked point to a deeper challenge for health care, for instance as described by Timmermans & Berg [23, 24]. They consider the dualism between what has been conceptualized as humanist care and technological standards as crucial to balance for health services to be sustainable

Such contradictions have been described between primary care and specialized services as units, and represent an underlying gap when it comes to collaboration. How may reconfiguration of standards in domestication processes

reconcile the dualism between standardized care and humanized care? Contradictions in goals of humanizing care with the use of technologies, standards and structures in health care will be addressed in the project.

A second challenge that will be addressed within this perspective is discussed by Sayer [22]. Reconciling the dualism between normativity and values on one hand, and reason may prove to be an active mechanism for obtaining a viable practice of integration and collaboration. The project will address such underlying philosophical issues in case they are made relevant for understanding active mechanisms involved in goal attainment of collaboration and integration. The agency in everyday evaluative actions relevant to motivation for collaboration will be discussed additionally.

The question is to consider how collaboration and improved care pathways are performed and done beneficial to patients, nurses and doctors, taking all aspects, regulations, standards and reforms into consideration or not. The point is to explore how VC collaboration is performed in practices in ways that professionals and patients experience as good.

In addition this continued project will take into consideration deeper philosophical contradictions described by Timmermans and Berg, and Sayer, as they affect or are affected in efforts to obtain goals.

V. CONCLUSION AND FUTURE WORK

I conclude with questions, assumptions, hypotheses and data sources for future work. The questions that the discussion point to are: How are units and dualisms affected? What are the vital components of viable practices? My assumption is that units and dualisms will be reconciled in situations where collaboration is performed via VC in ways that professionals and patients experience as good. The hypothesis is that the approach of heterogeneous assemblages will sensitize such discussions.

For the empirical study to come, a wide range of data will be collected from observations, interviews, local data bases and existing literature. The project will provide models of conditions under which VC works and where goals are considered as obtained. The collaboration models will include knowledge about what clinical areas, under which circumstances, and for which patients VC works according to goals. In addition, it will include knowledge about how goals are obtained, that is: what are the active mechanisms involved? It is underscored that use in itself is not necessarily considered a success and the users' understanding of goal attainment will be described and discussed.

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