Current Perception of Telemedicine in an EU Country

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\section*{ABSTRACT}

\textbf{Objectives:} To assess the perception and expectation of beneficiaries and providers of telemedicine services in Romania.

\textbf{Methods:} Interview (on-line and face-to-face) of 109 representatives of medical community, from two categories: physicians, involved directly in the patient care, and medical and information technology directors of state and private owned clinics and hospitals. A third group, formed by executives from main technology service provider companies, was added in order to expand the results with their vision as potential suppliers of telemedicine projects.

\textbf{Outcomes:} We evaluated 4 important aspects of telemedicine: actual status of the services, development efforts and allocated budget, expected future services, and stoppers and enablers. On the actual status we identified in 48\% of the cases the existence of core services good enough to start advanced telemedicine services. We developed a metric (SOR = Supporter/Opponents Ratio) to evaluate the suitability of telemedicine services to evolve and to deliver on expectations. The analysis shows that physicians see potential for development for EHR and PACS (both with SOR >25), but the executives start looking forward to more advanced services like remote patient monitoring. Main impact is expected in collaboration and patient quality life areas and, by far, the main stoppers are reduced budgets and organizational problems to adapt to the new data models.

\textbf{Conclusions:} We identified a strong support from the physicians related with the introduction of new type of healthcare services accompanied with high expectations. On the executive level, the expectations are different, ranging from low optimism on the technology side, to serious support on the medical side. However, there is a clear trend, able to create the first telemedicine services during the next years.
CURRENT PERCEPTION OF TELEMEDICINE IN AN EU COUNTRY

BACKGROUND

Teledicine” is one of the most used words in the medical and associated technical literature of the last 15 years. Serious and great discoveries related with both fundamentals of technology and their applications in the medical process have been made (1). After years of research, the theoretical models of remote medical assistance have been clearly stated. But, the big surprise came when, translating them in real life, differences start to show-up between delivered benefits and initial expectations (2). It became clearly that a telemedicine service is not come in “one-size-fits-all” form, and is highly dependent on local conditions, from measurable ones like financing, to the most abstract ones, such as culture (3). Despite all the progress, the real steps in implementation of such services came only in the last years when healthcare industry is pushed to decrease the costs and, in the same time, to increase the number of assisted patients in a world where both number and life expectancy of population is increasing constantly (4,5).

There are several pillars developed during last three years by the EU Commission in order to encourage the development of telemedicine services in the member states. Starting with the multiannual action plan for 2014-2020 (6), the principles have been stated and it was leaved to the local authorities “to develop common tools and mechanisms to address shortages of resources”. Teledicine is one of those directions that may bring better quality healthcare services and an optimized costs.

But, this term is not a precise one when it comes to real services. According to the American Telemedicine Association (7) “telemedicine” is the electronic transfer of medical data (e.g. high-definition images, sounds, live video broadcasts, health recordings, regarding the patient) from one place to another, at a distance, using a large set of technologies. This concept is easy to be applied in almost any medical specialty. Thus, this is already applied to dermatology, oncology, radiology, surgery, cardiology, and psychiatry, while new directions are continuously developed. Therefore, telemedicine is rather a collection of many narrow segments, each one significantly dependent on local conditions, than a uniform domain to which similar rules can be applied.

Since implementation of telemedicine is highly dependent on country conditions (8), our goal was to verify the influence of local conditions in Romania on the first telemedicine projects, and which future directions are expected. We aimed to understand not only the current status of telemedicine in Romania, but also the expectations (that ultimately drive the needs) that potential users have from this type of services, in order to see what are the benefits that may bring value if they are implemented in the Romanian market.

MATERIAL AND METHODS

We interviewed representatives from medical and IT providers, in order to build up a set of specific requirements that can be referenced for further projects in this area.

Study groups. We received answers from 109 voluntary subjects, 13 invited executives and 96 physicians, randomly selected from the respondents of more than 1000 e-mail invitations. Respondents are split in three categories related with their roles:
1. physicians clinically involved, as main users and beneficiaries of the telemedicine services (96 subjects).
2. medical executives, as approvers and sponsors of telemedicine services (6 Medical Directors, as the owners of strategy for medical services and 2 Chief Information Officers, as the owners of implementation and operation of ICT services).
3. ICT executives, as owners of their companies’ service strategy (5 directors from the top Service Providers).

Questionnaire. We used three sets of questions, each set being tailored to capture the requirements and expectations of each group. Thus, opinion of physicians was collected using 35 questions, focused on tactical, immediate use and expectations, while opinion of the medical executives and the ICT executives has been collected using 20 and 11 questions, respectively, orientated towards strategic issues related to development. The answers from the medical and ICT executives were captured by direct interviews, while for the physicians we published the questionnaire on a dedicated on-line survey platform (Google forms).
RESULTS

General characteristics of the study groups. The structure of the respondents relative to their medical specialty is shown in Figure 1. Regarding the size of the hospital where the physicians work, 31 worked in large hospitals (with more than 500 beds), 33 in medium size hospitals (with more than 100 and less than 500 beds), and 32 in small hospitals (with less than 100 beds). The experience of the respondents is well represented, with 33 physicians having more than 20 years of experience, 30 between 10 and 20 years, and 25 with less than 10 years. Nearly half of the respondents (43 out of 96) came from private hospitals.

Actual status of telemedicine services. The actual status of the basic service infrastructure for telemedicine is presented in Figures 2 and 3. In both groups (physicians and medical executives) we found evidences of a significant penetration of the ICT core services with laboratory and pharmacy (79%) ranked first, followed by EHR (60%), while PACS had a medium presence (40%). The EHR presence in more than half of the organizations is a good sign, as this is arguably the most important service needed for advanced telemedicine services, keeping the master data for all patients. Another key indicator is the presence of an integrated, or partially integrated HIS (59%), as a critical step for the development of any “non-trivial” telemedicine service.

Medical executives started to develop in their clinics some basic type of service for telemedicine, on top of existing infrastructure: two of these organizations had at least one external pilot project, while five were in the development phase of such a service. When it comes to internal services, the figures are even better, with 4 (out of 8) organizations being in the pilot
considered telemedicine as a strategic objective for their organization; meanwhile, they mentioned the expectation of a significant impact of these services in 3 to 5 years. They are looking forward to develop these new services by either internal efforts (46%) or by partnering with external organizations (54%).

Regarding the budget allocated to telemedicine, by comparison with the current budget, 3 medical executives, running public hospitals, declined to make comments. All the executives from the private organizations indicated an increase of the budget by less than 50% (with only one exception, intending to double the budget). On the ICT executive level, 3 of them had no intention to allocate additional budget, while one had the intention to decrease the budget (by less than 25%), and one to increase the budget (by less than 25%)

Figures 4 and 5 show the applications needing investments, according to the physicians and executives perspectives.

We asked the participants to mark “positive” or “negative” the financing of the most common telemedicine services. We used their answers to classify them in “supporters” and “opponents” of each service. Then, we calculated a Supporters/Opponents Ratio (SOR), as a basic measure of the ability of a certain service to receive budget. The most important services for the physicians were EHR and PACS, with SOR >25 while the least important was RPM with SOR = 4. For the executives, the most important service was EHR also (SOR = 3), followed by RPM and treatment adherence (SOR = 2) on the second position. The lower values of SOR result in executives’ case from the low number of answers.

Figures 6 and 7 shows which are the most suitable specializations going to benefit from the telemedicine services, according to the physicians and executives opinion.

Expected future services. In order to define which are those benefits expected by the medical community from the telemedicine services, we proposed an option list extracted from the literature, and asked the participants to rate them accordingly with their preferences.

Then, we eliminated the “Medium” and “Don’t know” categories and sum-up the extremes (“Very large” + “Large” and “Small” + “Very small”). We calculated the SOR (in terms of “High” vs. “Low”), showing the expectations of the study group (Figure 8).
**Stoppers and enablers.** We defined several “stoppers” for the telemedicine services, and we asked the physicians, as direct beneficiaries, to agree or disagree with them. As expected, literally all the responders agreed that the budget is the major limitation for the telemedicine services. Removing this unanimous option, we calculated the SOR (agree/disagree), as shown in Figure 9. “Enablers” of telemedicine services are depicted in Figure 10.

**DISCUSSIONS**

Actual status of telemedicine services. An organization can start successfully to develop its own telemedicine service only when specialized applications, such as electronic health record, electronic prescriptions, laboratory integration, some forms of imaging manipulation (acquisition, storage and retrieval), video and audio collaboration and all associated computing and communication infrastructure, reach a basic degree of interoperability and availability (5,8).

The actual status of telemedicine services in Romania shows that the opportunities for developing them are reasonably high, since 48% of the organizations have in place a combination of HIS and EHR, while 15% of them added video and collaboration capabilities on top of EHR and HIS. However, the gap related to audio/video collaboration services or any form of remote monitor of vital signs was important, requiring further tight cooperation with the ICT providers (9).

Overall, our figures give a rough indicator about the readiness of medical organizations to step into the telemedicine world. This means that, despite the current low profile, the telemedicine services might become reality in the next 12 months, with ICT service providers participating involuntarily to this effort (e.g. offering connectivity for RPM without being aware of its real utilization).

Development and budgeting. Despite the high level of strategic importance stated, when it comes to the formal discussions of the development of telemedicine services, these are rare: only 1 out of 5 has these kind of discussions monthly, all the rest discussing the topic only a couple of times yearly.

The uncertainty becomes even more clear when we look to the budgeting intentions of medical executives, showing a low appetite for near future investments. Therefore, we can conclude that there is a conservative approach, the whole market waiting for more clarity in order to take actions.

Adding to this medical perspective the ITC point of view, with their executives’ expectation to have in the next 3 to 5 years telemedicine services aligned with their other services offered (but not better), suggests that no clear “Go-to-Market” strategies are in place, and the few partnership policies started by the multinational companies are aimed to compensate the limitations of this approach (6).

Related to core ICT services, both physicians and medical executives expressed their preference for EHR, underlining the huge importance of this service for any advanced development (Figures 4 and 5). This suggests the consensus about the need for improvement of
the basic ICT services, before stepping into more advanced telemedicine services.

We noticed a definite preference of the medical executives for advanced services, combined with a low interest (SOR equal or even less than 1) when it comes to ICT services related to laboratory, pharmacy, and medical imaging. The most probable cause is the investment already done into this area, where executives expect to have results in the near future without spending new budget. Instead, they would rather focus the actual and future resources on what may be the new generation of health services (2). When we asked the executives to pick up only one service from the existing proposal, half of them (4 answers) pointed to RPM, similar with what ICT executives would do. This is a good example of alignment of executive visions, which can lead to an advanced service.

Regarding the most suitable specialty for the use of telemedicine (Figures 6 and 7), “Radiology” ranked first, since it is supporting all the other specialties for the diagnosis. The presence of “Family Medicine” in the top of the list might be explained by the growing importance of prevention, but also as a consequence of the recent pilot projects developed in Romania in the last years. Similarly, “Emergency Medicine” ranked first on the executives opinion, based probably on the promotion of the concept of “telemedicine” by the recent SMURD projects. “Cardiology” ranked second in both study groups, physicians and executives. This is not surprising, since it deals with the majority of chronic patients in Romania. Interestingly despite the respondents’ group composition, only 4 (out of 11) responders indicated “Surgery” and, more, only one responder indicated “Nutrition and Diabetology” which is somehow against the worldwide trend.

Using the SOR metric we observed (Figure 8) that the most important three perceived benefits of telemedicine services are in the area
of “Collaboration efficiency”, “Treatment quality”, and “Patient quality of life”. Low expectations are for “Error reduction”, “Reduce hospital time”, and “Increased number of patients”.

Stoppers and enablers. Ranking the lack of budget as the number one stopper by all responders is not surprising in the context of the current national budget for medical services in Romania. Other negative impact on future telemedicine services is due to the low capability of organizations to include this new type of services, and to the lack of a business model. Moreover, the lack of a business model is ranked high by the executives also, and this is probably the first issue that needs to be addressed (1).

Regarding the “enablers” (Figures 9 and 10), not surprisingly, the executives expect the legal framework to be the main driver for development of the telemedicine services, whereas the physicians are focused more on the ICT environment (infrastructure and applications). As executives are also recognizing the importance of infrastructure and applications (ranked 3rd and 4th), it is obvious that there is an important need of an architectural model for telemedicine services, integrating the business requirements with data, applications, and technology. This approach, proved to be successful in other domains, is in its early stages in the healthcare industry, due to the high level of fragmentation and regulation in this field. 

CONCLUSION

We identified a strong support from the physicians related with the introduction of new type of healthcare services, accompanied with high expectations. On the executive level, the expectations are different, ranging from low optimism on the ICT side, to serious support on the medical side. However, there is a clear trend, able to create the first telemedicine services in the next years.

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Abbreviation and glossary

ICT (IT) = Information and Communications Technology is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data.

EHR = Electronic Health Record is a systematic collection of electronic health information about an individual patient or population.

HIS = Hospital Information System is a comprehensive, integrated information system designed to manage all the aspects of a hospital’s operation, such as medical, administrative, financial, and legal issues and the corresponding processing of services.

PACS = Picture Archiving and Communication System is a medical imaging technology which provides economical storage of and convenient access to images from multiple modalities (source machine types).

RPM = Remote Patient Monitoring is a technology to enable monitoring of patients outside of conventional clinical settings (e.g. in the home), which may increase access to care and decrease healthcare delivery costs.
REFERENCES