Review of effectiveness criteria in the application of Telemedicine

Monfort-Vinuesa C.1, Gil-López P.2, Ramírez-Olivencia G.3, Chivato-Pérez T.4, Coca-Benito D.5, Fernández-Bermejo L.6

Sanid. mil. 2020; 76 (3): 161-169, ISSN: 1887-8571

RESUMEN
La telemedicina es una herramienta y recurso de gran utilidad para el diagnóstico y tratamiento médico. Desde su inicio en la década de los 70 se ha desarrollado de forma progresiva, demostrando el beneficio clínico que aporta a los pacientes y estando cada vez más presente en la actividad diaria de los clínicos. Diferentes estudios han tratado de definir y acotar su efectividad a la hora de aplicarse versus la asistencia presencial, siendo esta una variable importante a despejar. Este artículo realiza una revisión de las diferentes variables que se han acuñado para definir efectividad a la hora de tratar de demostrar la rentabilidad de incluir la telemedicina en la actividad asistencial diaria.

PALABRAS CLAVE: Telemedicina, e-salud, salud-móvil, efectividad, rentabilidad, ciencias económicas, militar.

SUMMARY
Telemedicine is a very useful tool and resource for medical diagnosis and treatment. Since its inception in the 70s it has developed progressively, demonstrating the clinical benefit it brings to patients and being increasingly present in the daily activities of clinicians. Different studies have tried to define and limit its effectiveness at the time of application versus face-to-face assistance, this being an important variable to clarify. This article reviews the different variables that have been coined to define the effectiveness when trying to demonstrate the cost-effectiveness of including telemedicine in daily healthcare activity.

KEY WORDS: Telemedicine, e-health, mHealth, effectiveness, cost-effectiveness, economics, military.

INTRODUCTION
Telemedicine is a term that was coined in the 70s with a literal meaning of «healing at a distance» (1). There are different meanings that try to define Telemedicine according to different health-related organizations. WHO (World Health Organization) defines it as «the provision health care services, in which distance is a critical factor, by professionals that leverage information and communication technology to exchange data to diagnose, recommend treatments and prevent diseases and accidents, as well as to continuously train healthcare professionals and perform assessment and research activities, with the objective to improve the health of the people and the communities in which they live» (2). On its own, the American Telemedicine Association restricts the term «Telemedicine» to «the exchange of health information from one place to another, using electronic communication means, for the health and education of the patient or the healthcare services provider, and with the objective to improve the patient’s care», (3)

In 1993 the term Telemedicine (4) was indexed in MeSH (Medical Subject Headings) in Medline. This can be considered as the beginning of Telemedicine Modern Age that lasts till today.

Recent progress and the increasing availability and usability of ICTS (Information and Communication Technology Services) by the general population have been the main reason for the growth of telemedicine in the last decade, creating new opportunities for the service and the provision of healthcare in a swift manner, mainly in emerging markets and in remote areas in developed countries (5) where there is a lower penetration of healthcare services.

The replacement of analogue communication by digital communication, combined with the fast decrease in ICT costs, has raised a significant interest in telemedicine by healthcare services providers and has enabled healthcare organizations to provide services to the population in more efficient ways (6)(7). The introduction and generalization of Internet services, as well as the ease of access to electronic devices has accelerated even more the rhythm of progress in ICT, broadening the scope of telemedicine to include applications based on Web services (email, tele consultations, Internet conferences) and multimedia approaches (digital images and video) (8)

In Spain, the Telemedicine Service in the Hospital Central de la Defensa «Gómez Ulla» (HCDGU) started in 1996. This service, named Telemedicine Unit, was the first Telemedicine Service in Spain. Since then it has accomplished several missions...
in healthcare provision, as well as education, consulting and research (9).

In the provision of healthcare services, it supports the troops both in operative and non-operative areas, broadening its scope to healthcare professionals, non-healthcare personnel, military and civil population in the area where the Armed forces may be running their mission. In operative areas, it represents a higher hierarchy Role 4 (HCDGU) for healthcare support, providing 24h coverage 7 days per week all year long (10). This important role is performed through consultations with healthcare specialists located in HCDGU, running complementary tests in real time (i.e. electro cardiograms, eco cardiograms, ultrasounds) as well as surgical tele assistance and tele-endoscopy, among others (11).

The development of this role started with the assistance to the troops deployed in Mostar (Bosnia-Herzegovina) in peace-keeping operations. It was possible to transmit bone x-rays to diagnose potential fractures (9).

Since that first case, the service has evolved to nowadays, when it provides more than two hundred teleconsultations per year.

Globally, the first articles from the article search on which this manuscript is based on appeared in 1990. However, across articles there are a number of concepts that are used indistinctively although they indeed are distinct. The key concepts to clarify are:

1. eHealth: «the cost effective and secured use of Information, Communication and Technology (ICT) in support of health and health related fields, including Healthcare services, health surveillance, health literature and health education, knowledge and research» (World Health Assembly resolution WHA 58.28 in 2005).

2. mHealth: «the use mobile devices, mobile phones, patient monitoring devices, PDAs and wireless devices for medical and public health practice (ex. Telephone helplines, text message appointment reminders, mobile telehealth and mobile access to Electronic Patient info».

3. TeleHealth: «The practice of medicine at a distance – involves the interaction between a Healthcare provider and a patient where the two are separated by a distance» (12).

Despite TeleHealth being a concept that has been around for nearly 20 years, and the increasing number of World Health Organization (WHO) member states that report an eHealth strategy (58% in the latest GOe report) (12), there are still very limited studies that report its effectiveness in a conclusive way.

The objective of this article is to define and scope the concept of «effectiveness» in the implementation of telemedicine.

MATERIALS AND METHODOLOGY

We conducted a literature review on Pubmed database from January 2014 to March 2019 using the english words of Telemedicine and Telehealth together with the words cost effectiveness, economics and military. The review has been established according to the following inclusion and exclusion criteria.

This manuscript focuses on Telemedicine as synonym to Telehealth.

Inclusion criteria:

• WHO published documents plus four articles from the Global Observatory of Health from the World Health Organization (WHO), specifically «Making universal health coverage achievable», «Report of the third global survey on eHealth», «Global strategy on human resources for health: workforce 2030», «Public Spending on Health: A Closer Look at Global Trends» y «Atlas of eHealth country profiles: the use of eHealth in support of universal health coverage» based on the findings of the third global survey on eHealth 2015 were also included to contextualize the reviewed articles within the WHO perspective.

• Bibliographic search in Pubmed database of articles in english language with keywords Telemedicine, Telehealth, cost effectiveness, economics and military in the period between January 2014 to March 2019.

• Articles defined as reviews.

Exclusion criteria:

• It has been limited to the articles that NOT included those words (Telemedicine, Telehealth, cost effectiveness, economics and military).

• Article's abstract did not correspond to this review's objective.

• Articles that despite having some of the target words in the abstract, the article did not cover the topic of this review.

CONCEPTS

Definition of «effectiveness»

A core part of this difficulty is the fact that there is not a single way of evaluation its effectiveness. In the Dec 2016 GoE Global survey on eHealth (12), only 29 countries reported that there was a Government sponsored TeleHealth evaluation and of those, only 22 reported the criteria. Even more, when reporting the criteria this varied across countries from program acceptance by the providers (16 of the countries) to cost effectiveness in target groups (10 countries) including program acceptance by the target groups (14 countries) or health outcome (11 countries).

Relevance

Universal Healthcare Coverage is a global challenge both in terms of sustainability and accessibility. In 2016, total Health care expenditure was $7.5 trillions equivalent to ≈10% of global Gross Domestic Product (GDP). Moreover, from 2010 to 2016 global Healthcare expenditure grew at an annual rate of 4%, well above GDP growth (2.8%) (13).

Expenditure per country varied from a very small 1.3% of GDP at Timor Leste to a 17.1% in USA. Access to practitioners also shows huge dispersion from 0.02 physicians per 10.000 inhabitants in Malawi or Niger to 7.74 physicians per 10.000 inhabitants in Qatar (14).

TeleHealth is expected to be an answer to these challenges by delivering cheaper – and more convenient - care to patients in specific diseases, leveraging adjacent professionals (i.e. Phar-
Table 1. Definition of effectiveness.

<table>
<thead>
<tr>
<th>Title</th>
<th>Mathematica</th>
<th>All cause mortality</th>
<th>All cause mortality</th>
<th>Fast recovery</th>
<th>Moderate recovery</th>
<th>Severe injury</th>
<th>Amputation</th>
<th>Length of stay</th>
<th>Summary</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 &quot;Therapy of bloodstream in patients with respiratory disease&quot;</td>
<td>None</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>Comments on this discipline is needed.</td>
</tr>
<tr>
<td>31 &quot;Telemedicine in the ICU&quot;</td>
<td>None</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>Several comments on sample design.</td>
</tr>
<tr>
<td>32 &quot;A systematic review of the evidence for the benefits of early prehospital transport&quot;</td>
<td>None</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>Comments on sample design.</td>
</tr>
<tr>
<td>26 &quot;Reduced risks of mortality from COVID-19&quot;</td>
<td>_yes</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>Comments on sample design.</td>
</tr>
<tr>
<td>28 &quot;Emerging challenges related to economic evaluation of telemedicine&quot;</td>
<td>None</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>Comments on sample design.</td>
</tr>
<tr>
<td>29 &quot;Telemedicine is a key component of the COVID-19 pandemic response&quot;</td>
<td>None</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>Comments on sample design.</td>
</tr>
</tbody>
</table>

References for use in the development of the criteria:

Monfort-Vinuesa C., et al.

Increasing the reach of prevention measures and/or enhancing clinical capabilities of primary care physicians.

Supporting evidence

Given the increasing adoption of Telemedicine initiatives across the world, and the challenges for sustainability and accessibility of Healthcare services globally, it is important to assess how and when these programs are most effective. However, there is very limited conclusive evidence of it.

These articles analyze the effectiveness of Telemedicine in very specific situations including Respiratory diseases (1), Intensive Care Unit (ICU) (1), Teledentistry (2, with different target populations), Teledermatology (3), Diabetes (2), Chronic diseases (2, with different target populations), mHealth (1), Active aging (1), Heart failure (1), Musculoskeletal (1), Primary care (1), Triage in war (1), Veterans Posttraumatic Stress Disorder (PTSD) (2), Depression (1), Gynecology (1), Rheumatic (1), Neurology (1), Pharmacist (1), Mental health in Corporate settings (1), Telesonography (1), Kidney (1) and Hypertension (1). There are also 5 articles that look at Telemedicine with a more general view including description of different methods to calculated costs, focus on barriers and on user's satisfaction. The key findings of these articles can be found in the attached table.

One key limitation of most of these studies is that they have been performed in developed countries, where the challenge is more on sustainability than accessibility. Indeed, out of the 34 articles reviewed, only one was focused on developing markets (15). This article highlights the paradox of Low and Middle Income Countries bearing the greatest burden or neurological disorders and at the same time a profound paucity of neurologists.

It reviews an intervention for Parkinson in Cameroon where neurologists tele-support primary care physicians. As such the main focus was not on increasing accessibility but on increasing the knowledge of primary care physicians.

There are other articles that also indicate the benefits of Telemedicine – specially from the patient perspective - in low accessibility contexts for patients from developed countries.

One particular area of focus in military contexts, of those 3 have been subjects of specific studies.

1. Treatment of displaced patients while in 1992 during the ‘Operation Restore Hope’ humanitarian relief mission in Somalia (16). There is supporting evidence of the US Department of Defense offering telemedicine for dermatology conditions to troops abroad. This is very relevant as dermatologic conditions account for up to three quarters of outpatient visits in combat zones and skin complaints constitute just under half of military telemedicine consultations.

2. Veterans care when they suffer from PTSD and they live in rural areas due to the time saved in transportation and reduction in waiting times (17).

3. Remote triage in the battlefield, based on the readings from vital signs sensors, so that most critical ones can be rescued faster and more safely (18).

Another context includes patients that are isolated even within a developed country like indigenous tribes and telemedicine is received favorably (19).

Sustainability

On the sustainability perspective, there are different views depending on whether this is approached from a cost-effectiveness or health outcome with little consensus.

Cost effectiveness

On the cost-effectiveness angle, there is a need for an homogenous definition of what costs should be included, not only for the provision of the service, which could be determined following a micro-costing, activity based costing, charge based costing or gross costing calculation (20), but also including other indirect costs (17) like driving time to the appointment or organizing for childcare. Some studies also include the physician opportunity cost (21) measured in terms of how much time a physician needs to assess one patient in person vs using telemedicine. Until a common approach to cost definition is agreed, it will be difficult to run pilots that are universally acceptable. To address this issue in the mHealth space, Sarah Iribarren proposes the use of the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist for reporting of economic evaluation (22). One additional complication is the evolution of technology costs and bandwidth availability that make cost-effectiveness to vary over time. Indeed, a study of telemonitoring for elderly patients with at least one chronic condition concluded that these programs have decreased their cost since 2004 due to cheaper technology (23). Even more, with more and more devices in the patients’ hands, some interventions (like reminders or videocalls) can be provided without installing any additional technology in the patient’s home. However, for other interventions one-off costs could be significant both if the devices are installed at home like in Obstetrics pilots that required the provision of Dopplers to the patients (24) or in specialty hospital areas like ICU where the increase in the number of patients supervised by an intensivist seem to compensate the increased cost of >$50.000/bed (25). In chronic diseases like diabetes, a systematic review (26) found that teleophthalmology was cost-effective for retinal screening as well as telephone reminders and telemonitoring for diabetes management. However, another study on diabetes patients (27) found that although education self-management support programs seemed cost-effective, telemedicine-type interventions for these customers seemed not to be based on the existing data. In the same line of thinking, another study (28) found emerging evidence that remote consultation was not cost-effective for patients suffering from depression. Finally similar preliminary conclusion of expensiveness was reached in a telemedicine-based collaborative care study for PTSD (29) although results improved its cost-effectiveness when the patient had comorbid mental disorders.

Health Outcomes

On the Health outcome angle, there is very little conclusive evidence. The analyzed articles include three potential different usages of Telemedicine to improve health outcomes with
Table 2. Article summary.

<table>
<thead>
<tr>
<th>Article summary</th>
<th>Article summary</th>
<th>Article summary</th>
<th>Article summary</th>
<th>Article summary</th>
<th>Article summary</th>
<th>Article summary</th>
<th>Article summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saniday mil. 2020; 76 (3)</td>
<td>Saniday mil. 2020; 76 (3)</td>
<td>Saniday mil. 2020; 76 (3)</td>
<td>Saniday mil. 2020; 76 (3)</td>
<td>Saniday mil. 2020; 76 (3)</td>
<td>Saniday mil. 2020; 76 (3)</td>
<td>Saniday mil. 2020; 76 (3)</td>
<td>Saniday mil. 2020; 76 (3)</td>
</tr>
</tbody>
</table>
regards to sustainability (excluding the accessibility cases described above) from less to more strict description of Telemedicine as «The practice of medicine at a distance – involves the interaction between a Healthcare provider and a patient where the two are separated by a distance» (12). Out of these three potential usages, two of them focus on the relation between the physician and the patient and the last one on the relation between physicians.

1. Telemedicine understood as controlling vital signs of patients remotely

This application of Telemedicine has been studied on patients with respiratory diseases – including chronic obstructive pulmonary disease, asthma, interstitial lung disease and neuromuscular diseases - who sent their signs or monitored with smartphone or telemonitoring equipment for long periods in hospitals. The same concept applies to the monitoring of patients’ vital signs in ICU remotely where one single intensivist relies on non-specialized personnel to cover up to 150 beds resulting in four out of six studies in reduced mortality (31). However, another article (25) found the results in ICU much less conclusive with a broader heterogeneity of outcomes, even including an increase of transfer between hospitals, which could be due to differences in software, processes and protocols or training. Similarly, a study on transitional care in patients discharged from the hospital with heart failure (32) found that telemonitoring did not improve clinical outcomes while Nurse case management and disease management clinics did reduce all-cause readmissions hinting at better outcomes when face-to-face assessment is involved.

Therefore, this application’s effectiveness seems to depend on the underlying condition being monitored and the detailed processes followed requiring education both on the patient, physician and additional staff involved.

2. Telemedicine understood as provision of consultations remotely

This application was studied to understand the benefits of Telerheumatology and Teledentistry finding that results were comparable effectiveness-wise to in person delivery (33). The same conclusion is found in Teledermatology studies (16)(21) and studies on the provision of musculoskeletal interventions through videoconferencing (34), the latter finding positive impact on health outcomes and patient satisfaction. Likewise, Telemedicine seems to be effective in the remote consultation for PTSD in veterans when measured as symptom reduction vs in-person treatment (17). However, another study in Teledermatology showed more mixed results with 34 of 74 studies finding Teledermatology outcomes better than face-to-face (35); 25 of the 74 studies similar, but 15 of the 74 inferior. Additionally, this approach has been tested in obstetrics and gynecology where in-person visits are combined with virtual ones, but the tests did not have enough data to support a positive conclusion. An interesting distinction has been found in Telerheumatology (36) where although there were conflicting results with 18 out of 20 studies finding telemedicine effective, one out of twenty potentially harmful and one out of twenty ineffective, a distinction was made on when to use Telemedicine recommending face-to-face for the diagnosis of a new condition vs a potentially more effective Telemedicine when focused on the management of the established conditions.

Therefore, this application seems to be more effective for some diseases than other and in general more data and deeper studies are required to validate its application in new areas.

3. Telemedicine understood as remote support to another physician

An analysis of this application identified eight themes that contributed to high quality supervision (37) including supervised characteristics, supervisor characteristics, supervision characteristics, supervisory relationship, communication strategies, prior face-to-face contact, environmental factors and technological considerations. Another study found that having specialists supporting primary care physicians on the phone reduced visits to the former (38). Likewise, in Teledentistry (39) there is an increase in accuracy when an advising clinician is involved although the quality of the image is mentioned as a key determinant of the outcome, and it is an intervention to build and increase clinical capacity of the dental workforce. Less advanced is Telesonography, where simulations have been made (40) to assess whether it could also be used particularly in the context of under-resourced settings. Despite its current use, given the equipment requirements to ensure the signals are read and transmitted accurately, there are no conclusive studies on whether it is cost-effective in these settings and more studies are needed.

Therefore, this application seems to be promising to build clinical capacity and improve outcomes in primary care and Teledentistry while its application to other areas need further research.

OTHER TOPICS

Barriers

Beyond the cost-effectiveness and health outcomes evidence, that as we have seen varies a lot depending on the specific application and disease, as countries there are important barriers that need to be tackled.

A review of these include (41) highlighted as the most frequent ones: technically challenged staff, resistance to change, cost, reimbursement, age of patient, level of education of patient. Other barriers included confidentiality, legal and liability issues, unawareness or uncertainty of outcomes, poor design

Sanid. mil. 2020; 76 (3)
or interoperability. Many of these barriers could be addressed through training and/or focused policy making.

For example, in the State of Mississippi (42), they embraced since 2003 Telemedicine as a way to address the low physician density. One of the key actions was taken by the Mississippi Insurance Code which in its Parity Law required reimbursement for Telemedicine services at the same rate as regular medical services, solving the concerns about reimbursement amongst practitioners.

Another important barriers are legal issues and uncertainty (30). For example, whose responsibility it is if due to a misunderstanding the patient misses a device, proliferation of devices not yet approved by the FDA, privacy protection of the solution creator and safety.

Finally, an additional concern is that with a proliferation of medical applications available, patients would do their own diagnosis and avoid visiting a practitioner with the associated health risk (16).

Acceptance

In general, studies show a positive acceptance of Telemedicine by patients. There are examples of indigenous tribes tending to be satisfied with telehealth (19), although it is not clear if this is about telehealth per se or about the benefits of receiving any service at all in a remote community. Another broader article (43) found that patients expectations were met when providers delivered healthcare via videoconference or any other telehealth method. The main sources of satisfaction listed were improved outcomes, preferred modality, decrease travel time, ease of use and improved communication.

Additional applications and growth

Beyond the examples described above, there are specific initiatives that had been launched to assess the effectiveness of Telemedicine to address concrete health challenges.

One of them, the Kidney Health Initiative (44) identified several benefits of using Telehealth in renal patients including a potentially increased acceptance and uptake of home-based dialysis modalities giving patients higher level of independence while simultaneously providing a strong support network to ensure good outcomes. Another identified benefit included ongoing training, education and counseling opportunities for the patient as a telehealth care team would monitor the patient and avoid infections and injuries. A final benefit could be to monitor the treatment and collect parameters for immediate action or storage for later analysis.

Another initiative is to address home blood pressure measurement (45). Hypertension guidelines recommend the use of home pressure monitoring for hypertension management. However, patients seem to do it wrongly at no specific times. Telemonitoring of home Blood Pressure readings overcomes many of these barriers and has the potential to increase the accuracy, efficiency and convenience of home Blood Pressure monitoring. Nevertheless, certain structural and financial barriers must first be overcome including the concern for security and data privacy.

Scope expansion

To address the physicians shortage, especially in developed countries where Healthcare costs are growing due to population aging, there have been some interventions focused on leveraging pharmacists to provide telemedicine in outpatient or ambulatory care setting (46). The studies analyzed had mainly a positive impact with higher impact rate when the intervention was scheduled and continuous vs responsive and reactive. A variety of technologies were utilized including telephone, videoconsultation, text or electronic messaging, email, automated electronic reports and fax. The interventions included pharmacist-led telephonic clinics, post discharge follow up, medication counseling, virtual management by an interdisciplinary team, remote monitoring of lab values and vital signs, medication therapy management, text reminders and instructional videos or calls. Illnesses included hypertension, diabetes, anticoagulation, depression, hyperlipidemia, asthma, heart failure, HIV, PTSD, chronic kidney disease, stroke, COPD and smoking cessation. Positive outcomes were measured on three aspects: clinical disease management, patient self-management and adherence.

Another application of telemedicine techniques in a broad setting was reviewed in an article that evaluated 23 controlled trials of eHealth interventions for reducing mental health conditions in employees (47). Three main types of interventions were identified including cognitive Behavioral Therapy, Stress management and mindfulness based treatments. Of these, Mindfulness showed larger effects than the other two although organizations should be aware that achieving the best outcomes depends upon providing the right type of intervention to the correct population.

CONCLUSIONS

Telemedicine experiences are growing across the world and a growing number of countries are adopting eHealth strategies and launching initiatives. While Telemedicine can solve two basic issues -accessibility and sustainability – most studies are focused on the latter: how to provide a sustainable service in developed countries where the percent of GDP dedicated to Health care is growing faster than GDP. When studying sustainability, there are two main concepts that are analyzed: cost – effectiveness and health outcomes. The studies reviewed showed that there is limited evidence of both mainly based from a lack of common approach to which costs should be included (direct, indirect, opportunity costs) and proper controlled trials. Still, there seems to be some areas of telemedicine that are growing faster than others, specifically Teleradiology, Telepathology, remote patient monitoring, Teledermatology and Telepsychiatry and patients acceptance seems to be overall positive (12).

In order to build Telemedicine’s growth on strong foundations, we recommend a higher degree of coordination in the defi-
nition and evaluation of trials (what to measure, how to measure), what cases to prioritize to avoid fragmentation and in the assessment of the costs involved.

The technology evolution and the increased literacy of both patients and physicians in technological devices will decrease costs and other barriers to adoption (unawareness, training). However, policy makers also need to contribute to the decrease of barriers related to privacy, reimbursement and certification.

As a closing note, regardless of the cost considerations, it is a fact that more doctors are required, both in developing countries, where physician density is very low, and in developed countries, where population aging increases medical needs. Specifically in this latter case, existing research has been inconclusive given it has focused more on breadth than depth limiting the relevance of the findings (48). The WHO (49) in 2016 concluded that by 2030, there would be a shortage of 2.3 Mn physicians globally (and a total shortage of 14.5Mn health professionals). Finding ways to expand the reach of the existing physicians either by enabling them to monitor more patients simultaneously, coach other physicians, leverage adjacent professionals or reducing their travel time as long as patient risks are not increased seems worth investing.

REFERENCES

12. Observatory G. Global diffusion of eHealth

168 Sanid. mil. 2020; 76 (3)
Review of effectiveness criteria in the application of Telemedicine