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HEALTH PROMOTION

Telemedicine: the Technological Revolution to Address Healthcare System Shortcomings

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To the Editors,

In an increasingly complex and challenging healthcare landscape, telemedicine presents an opportunity to improve access to care and ensure that healthcare is always close to citizens [1].

Telemedicine can reduce inequalities, effectively improving access to personalized healthcare services for everyone. However, the result depends not only on the availability of appropriate technological tools but also on the digital literacy of both patients and healthcare personnel [2]. Otherwise, there is a real risk of exacerbating inequalities and compromising equitable access to care.

In Italy, new solutions in telemedicine are increasingly being implemented, radically transforming the doctorpatient relationship, improving access to specific services, and overcoming geographical and temporal limitations.

One area where this tool is being used is the ASL of Latina (Italy): a local health authority in Lazio Region that covers a very large province stretching from Circeo to Sabaudia, including the islands of Ponza and Ventotene [3]. With nearly 600,000 inhabitants, 5 districts, and 4 hospitals in a diverse territory, new technological possibilities are being used to measure and address disparities.

Regarding territorial healthcare a department for the protection of vulnerabilities has been established, comprising a network of consultation offices, a structure dedicated to adult disabilities, a reference point for the migrant population, hospices and palliative care, territorial oncology, and nursing homes. To improve the care of chronic patients, a community nurse has been established.

Telemedicine tools, such as teleconsultation and telemonitoring, which have increasingly gained ground following the COVID-19 pandemic, are playing an increasingly significant role in patient-centered healthcare. In particular, the ASL of Latina boasts a highly developed system for managing heart failure: 2,700 patients are enrolled, and of these, just over a thousand have an implanted device such as a pacemaker and are managed entirely remotely with home tele-

visits. A telemonitoring system is in place, verified for 12 hours a day by a hospital cardiologist through an always-active central unit linked to the "Pontine Acute Myocardial Infarction Network". Operating since 2012, the network - aligned with high international standards - relies on the 118 operations center in Latina, with 23 telemedicine systems onboard as many ambulances, emergency rooms with 10 additional telemedicine systems, 24-hour hemodynamics at the central hub, and the intensive cardiac care unit at Santa Maria Goretti Hospital (Latina, Italy), which serves as the central listening, reporting, and teleconsultation center. This makes the hospital the first in Italy for the treatment of acute myocardial infarction according to the ranking by the Italian Society of Cardiology and Hemodynamics, and it ranks among the top ten in Europe, fourth in Italy, and first in Lazio for coronary angioplasty.

A decline in hospitalizations was reached, reconfirmed year after year compared to when this project was not active before 2019. According to the National Outcomes Program editions for the years 2012 and 2018, a clear decline in hospitalizations for acute myocardial infarction was observed. This recorded decline was -7.6% in 6 years. This success derives from the improved management of patients. The combination of heart failure management and the network that has brought electrocardiographs onto ambulances for 10 years, transmitting the trace immediately – even from the islands - to the cardiology operations center for immediate verification if the patient should be taken to the thermodynamic room. Data also show a reduction in the mortality index for heart attack, placing it among the most virtuous regions in Italy for this cause of death. "Mortality for acute myocardial infarction 30 days after hospitalization has indeed dropped from 10% in 2012 to 7% in 2018, practically 30% fewer deaths, meaning 800 lives saved between 2013 and 2018 [4].

Teleconsultation is also used in Liguria Region (Italy) where the San Martino Polyclinic in Genoa is the hub of patients of high complexity care. This organizational model allows the centralization of specific cases.

The hub was alerted by the San Paolo Hospital in

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Savona: once the patient was examined, Savona doctors were able to send 1,800 CT images in seconds to the San Martino surgeons via teleconsultation.

Recently, an emergency flight saved a 53-year-old patient with an aortic dissection at risk of rupture and cardiac tamponade. The woman was operated on by cardiac surgeons at the Polyclinic.

Telemedicine can also address current healthcare system shortages: offering online visits can help reduce waiting lists for outpatient appointments, disseminate useful information to the population, and encourage preventive care, reduce costs, and optimize resources by reducing physical appointments when not essential [5]. However, its effectiveness depends on strategic integration into the healthcare system and staff training. At the same time, we cannot rely solely on "remote" solutions to address current healthcare problems such as the shortage of general practitioners. In the immediate term, technological tools can address an emergency situation like this, but in the coming years, careful planning will be necessary: "According to the Italian National Medical Insurance and Welfare Board (Enpam) estimates, as of December 31, 2021, more than 50% of GPs were over 60 years old, and therefore a massive retirement is expected in the coming years: considering a retirement age of 70, about 20,000 GPs should retire by 2031". The effects of this situation are already evident in some areas [6]. This is the case of the Bergamo Health Protection Agency (Italy), which faced a significant shortage of family doctors. Around 20,000 people were left without a primary care physician for more than 18 months. Initially, efforts were made to maintain continuity of care with the opening of temporary clinics staffed by on-call doctors and GPs, but the high influx made it complex to track all services provided. At the same time, it was not simple identify in which time slots the available doctors could take on "extra" patients. Therefore, a platform was created to match the availability of general practitioners with patients "orphaned" of their doctor. The benefits were immediately apparent: patients could book visits not based on their residence but according to their preferences, such as proximity to work, and doctors accessed a direct payment system for services, all managed electronically. Ninety professionals joined, uploading their available hours online: Bergamo residents now have an app to book directly from their smartphones, and 240 local pharmacies participated to assist patients less familiar with technology. In 2023, 9,000 services were provided monthly, 2,000 of which were in the seven community health centers in the area, indicating a growing trend among those who prefer to receive care at their clinics. This is an example how the technology can and should make the Italian healthcare system more efficient. Yet, there is still much to be done in Italy: for this reason, the National Recovery and Resilience Plan (PNRR) allocated 60% of funds to developing digital skills to bridge the gap with more advanced countries in this regard [7]. Previously allocated digitization funds in various regions were never adequately used, and now we must accelerate and recover 'lost time'.

One of the most common problems is the fragmentation of systems and software incapable of communicating with each other. This is precisely what the Abruzzo Region faced after the advent of COVID-19, committing to a dense schedule of digital health in its 2021-2023 three-year plan. It started with training for healthcare personnel, followed by piloting billed services. Efforts were made to facilitate citizen access to choose and possibly revoke their general practitioner, and to create a single booking center (CUP) to address patient healthcare booking difficulties. Significant changes are currently being made to the vaccination registry to unify it and improve screening analysis, ensuring no relevant patient information is overlooked. Additionally, an integrated imaging diagnostics system and a unified platform for laboratory test reporting are being developed, enabling external specialist consultations for certain rare diseases and optimizing resources simultaneously. Consequently, citizens are facilitated in accessing healthcare services, and doctors are provided with new and effective diagnostic platforms.

However, it should not be forgotten that behind artificial intelligence algorithms and teleconsultation or telemedicine, there is always the responsibility of the doctor who must oversee the contribution that innovation can make in terms of higher quality, for example by limiting the possibility of human error [8]. Continuous training for doctors is therefore necessary, supported by engineers to manage these new devices. It is essential that they are European Conformity (CE) certified to ensure their safety. The risks are evident: from respecting patient privacy and the security of personal data, which could be subject to breaches or unauthorized access, to actual malfunctions of medical devices. The digital divide among the population must also be considered, as not everyone can benefit from the advantages of telemedicine, which, if improperly used, can result in a loss of human contact in the doctorpatient relationship, compromising empathy and the necessary doctor-patient relationship. Moreover, technology is costly, and each healthcare manager must identify the priorities for investment to improve their healthcare organization.

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Conflicts of Interest

The authors declare no conflict of interest.

Authors' contributions

All authors contributed equally to the development and preparation of the manuscript.

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