Feasibility and acceptability of telemedicine to substitute outpatient rehabilitation services in the COVID-19 emergency in Italy: an observational everyday clinical-life study

Authors
Stefano Negrini, MD (1,2)
Sabrina Donzelli, MD (3)
Alberto Negrini, Eng (3)
Alessandra Negrini, PT (3)
Michele Romano, PT (3)
Fabio Zaina, MD (3)

Institutes
1. Department of Biomedical, Surgical and Dental Sciences, University “La Statale”. Via Festa del Perdono 7, 20121 Milan, Italy
2. IRCCS Istituto Ortopedico Galeazzi. Via Riccardo Galeazzi, 4, 20161 Milan, Italy
3. ISICO (Italian Scientific Spine Institute), Via Roberto Bellarmino 13/1, 20141 Milan, Italy
Abstract

Objective: To investigate the feasibility and acceptability of telemedicine as a substitute of outpatient services in emergency situations like by the sudden surge of the COVID-19 pandemic in Italy.

Design: Observational cohort study with historical control.

Setting: Tertiary referral outpatient Institute.

Participants: Consecutive services provided to patients with spinal disorders.

Interventions: Telemedicine services included teleconsultations and telephysiotherapy. They lasted as long as usual interventions. They were delivered using free teleconference Apps, caregivers were actively involved, interviews and counselling were performed as usual. Teleconsultations included standard, but adapted measurements and evaluations in video and from photos/videos sent in advance according to specific tutorials. During telephysiotherapy, new sets of exercises were defined and recorded as usual.

Main Outcome Measure(s): We compared the number of services provided in three phases, among them and with corresponding periods in 2018 and 2019: during CONTROL (30 working days) and COVID surge (13 days) only usual consultations/physiotherapy were provided, while during TELEMED (15 days) only teleconsultations/telephysiotherapy. If a reliable medical decision was not possible during teleconsultations, usual face-to-face interventions were prescribed. Continuous quality improvement questionnaires were also evaluated.

Results. During TELEMED, 325 teleconsultations and 882 telephysiotherapy sessions were provided in 15 days. We found a rapid decrease (-39%) of outpatient services from CONTROL to COVID phase ($R^2=0.85$), partially recovered in TELEMED for telephysiotherapy (from -37% to -21%; $p<0.05$), and stabilised for teleconsultation (from -55% to -60%) interventions. Usual face-to-face interventions have been needed by 0.5% of patients. Patients’ satisfaction with telemedicine was very high (2.8/3)

Conclusion(s): Telemedicine is feasible and allows to keep providing outpatient services with patients’ satisfaction. In the current pandemic, this experience can provide a viable alternative to closure for many outpatient services while reducing to a minimum the need of travels and face-to-face contacts.

Keywords
Telemedicine, telerehabilitation, outpatients, Covid-19, epidemic
Introduction

COVID-19 is spreading all over the world and the World Health Organization declared a pandemic.\textsuperscript{1} China faced it with a total quarantine of the affected areas to eradicate the virus.\textsuperscript{2} Italy, and now most of other countries, adopted a partial quarantine to mitigate the epidemic.\textsuperscript{3} This strategy aims to decrease the heavy impact on the health systems and allow hospitalization and intensive care of the huge number of patients in need, reducing the overall mortality.\textsuperscript{4}

The COVID-19 emergency is hitting hard not only infected patients but also all the others.\textsuperscript{5} In many countries, outpatient services have been fully closed due to the need of physicians for COVID-19 patients and to reduce the risk of infection due to travels. Consequently, outpatients are on their own and mostly self-managing. This is not acceptable for diseases that can still have sudden, important progressions even in a few months, and even less acceptable in children.\textsuperscript{6} All these could become collateral damages of the COVID-19 emergency.

Telemedicine is defined as the exchange of medical information using electronic tools. It has multiple applications and can be used to provide different services, including consultations and physiotherapy. Telemedicine has shown to be effective in specific areas of care, particularly where technology is involved or medical “hands-on” techniques are less important.\textsuperscript{7} To our knowledge, there are no published results about the application of telemedicine to patients with spinal deformities.

In front of the sudden COVID-19 emergency in Italy, and the mobility restrictions to the population, to continue to provide our outpatient services (including hands-on physiotherapy and medical evaluations) we have been forced to convert completely to telemedicine, rapidly developing specific ad-hoc solutions. We are not aware of studies about such a total conversion, for neither medical consultations (teleconsultations) nor physiotherapy sessions (telephysiotherapy).

The aim of this paper is to report the feasibility and acceptability of telemedicine as a substitute to usual tertiary referral outpatient rehabilitation services. We looked at the numeric impact on services of (1) the COVID-19 surge in Italy and (2) the subsequent complete, immediate and enforced shift to telemedicine (teleconsultations and telephysiotherapy). This will inform present and future emergency situation of total or partial lockdown, as well as other conditions precluding transportations.

Material and Methods

Italy discovered to have an epidemic of COVID-19 under way on February 24\textsuperscript{th}, 2020 and immediately red zones (total quarantine) were imposed close to Milan. This did not reflect straightaway on the services provided, but the weekly cresendo of partial quarantine throughout the country, with closure of schools on March the 2\textsuperscript{nd} and travel restrictions on the 8\textsuperscript{th} drove to a clear drop of services (Figure 1A). This reduction, and the safety needs of patients and health professionals, urged the decision to move all activities of our Institute to telemedicine on the same day of Prime Minister’s decree to shut down all commercial activities (March 11\textsuperscript{th}). On the 16\textsuperscript{th}, all usual face-to-face services were stopped, unless required following telemedicine.

The setting is a tertiary referral outpatient rehabilitation institute for spinal deformities, specialised on pediatric health conditions. The institute usual services include face-to-face consultations,\textsuperscript{8} physiotherapy (evaluation, exercises teaching, cognitive-behavioral approach and counselling)\textsuperscript{9} and psychological sessions, with brace fitting provided in orthotics facilities.\textsuperscript{10} Starting from a few previous telephysiotherapy feasibility experiences, we developed in a few days and started in emergency brand-new protocols, by discussion and consensus among the most experienced physiotherapists and physicians. The protocols were discussed and agreed on by all the other professionals in 2 meetings, that were repeated weekly during the study.

Supervision was provided to all professionals. A few adaptations to the original protocol were performed in the first week.
The telemedicine service has been offered to all our patients aged between 3 and 18. For this analysis, we retrospectively included all services provided from January 7th, 2018 to April 3rd, 2020. Telemedicine interventions (Table 1) have been delivered using free teleconference Apps (Skype™, Whatsapp™ and Google Meet™ software). We provided patients written/video tutorials describing how to collect photos/videos of clinical evaluations, imaging and/or of exercises using home tools (rulers and goniometers). These were received before the telemedicine sessions. All telemedicine sessions lasted as long as usual. Clinical history, conclusions and counselling were performed as usual. Teleconsultations innovations included measurements of the photos/videos previously provided using the software SurgiMap™, that were confirmed by “live” measurements repetition under direct medical guidance. Telephysiotherapy sessions innovations included teaching of exercises using the hands of parents under physiotherapist guidance, and the usage of normal house furniture as treatment tools.

We considered 3 phases: (1) CONTROL: usual services prior to discovery of COVID-19 spread (creation of “red zones”), 30 working days (January 7th to February 23rd); (2) COVID: Impact of COVID-19 surge on usual services before starting telemedicine, 13 working days (February 24th to March 14th); (3) TELEMED: services provided only in telemedicine, 15 working days (from March 16th). During CONTROL and COVID the Institute provided only usual consultations and physiotherapy, while during TELEMED only telemedicine services (telephysiotherapy and teleconsultations). If a reliable medical decision was not possible during teleconsultations, physicians prescribed usual face-to-face interventions. Continuous quality improvement questionnaires were also evaluated.

Satisfaction with services provided was evaluated at the quality continuous improvement questionnaires, while all professionals were closely monitored throughout the period with supervision, and email consultations. At the end of the study period they were asked to send their positive and negative comments on the experience.

The variation of the provided services in total, and in 2 groups (physiotherapy and consultations, the last divided in 3 sub-groups: first visits, follow-ups and brace checks) were compared in the 3 phases among them in 2020, and with the same periods in the years 2018 and 2019. We considered the explanatory categorical 3-level variables years and phases. We checked differences between and within the variables through a two-way ANOVA, a post hoc analysis with Scheffe correction for significant differences, and marginal means. We also performed a regression analysis within each phase to check the influence of days on services provided.

We used STATA 15 and Excel.

**Results**

During TELEMED, in 3 weeks (15 working days), 12 physicians and 38 physiotherapists provided 1,207 interventions (325 teleconsultations, 882 telephysiotherapy sessions). We found in 2020, but not in 2018 and 2019, a rapid decrease of outpatient services in COVID phase (-39%) in both groups (-37% physiotherapy sessions, -55% consultations). We also found differences among phases in 2020 (Table 2): comparing to the great losses from CONTROL to COVID, during TELEMED physiotherapy recovered (from -37% to -21%; p<0.05), while consultations did not. For consultations there were differences among sub-groups: follow-up teleconsultations stabilised (from -55% to -60%), while first visits (from -34% to -89%) and brace checks (from -16% to -75%) almost disappeared (Figure 1B). The regression describes well the day-by-day effect of COVID-19 and telemedicine within the phases: all services and physiotherapy subgroup decreased in COVID phase (p<0.01; R²=0.85 and 0.62, respectively), and consultations increased in TELEMED (p<0.05; R²= 0.31) (Figure 1C). During TELEMED, 0.5% of patients were required by physicians, after the teleconsultation, to move from home to reach our Institute for a usual face-to-face consultation.
Quality continuous improvement questionnaires (response rate 38%) reported a mean satisfaction of 2.8 out of 3. All physicians and therapists have been very happy with their experiences, confirming that it was possible to work properly. Those less used to technology declared surprise and great satisfaction with the services delivered.

Discussion

The sudden surge of COVID-19 in Italy created an ideal experimental setting for telemedicine. Our Institute provided only usual face-to-face services until March 14th. From March 16th, only telemedicine was provided, and face-to-face consultations were possible only if required by a physician as a result of the teleconsultation. Consequently, the reduction of number of services provided by the Institute shows the difficulty of patients with usual outpatient services during the pandemic in Italy. Even before the total lockdown (March 11th), there was a clear, progressive and continuous reduction during the COVID phase. Conversely, when the Institute moved completely to telemedicine, the recovery (even if not at the previous level) documents the value and feasibility of telemedicine for patients and professionals, particularly in emergency situations. Patients were satisfied according to the quality questionnaires, and all professionals were interviewed declaring their satisfaction. Physicians felt comfortable with the teleconsultations' results, and required a face-to-face consultation, with consequent travelling to reach our facilities, for only 1 patient out of 200.

The COVID-19 pandemic started in China currently has its epicentre in Europe and it’s quickly spreading. Italy was the first country hardly struck by COVID-19 after China, with the Public Health System struggling to react. Outpatient services were shut down to move the staff to COVID-19 services. In previous epidemic emergencies, a dramatic reduction of public services has been documented too. Nevertheless, this pandemic is posing unique challenges to the health systems worldwide. It is clear that a major need is to guarantee a continuum of care to other patients unaffected by the virus, while at the same time protecting them from possible contact with it, avoiding travels and access to health facilities.

Despite the unavoidable limits due to its observational nature and the use of an historical control, this first study shows the possibility to completely transform also classical “hands-on” outpatient services to telemedicine in the COVID-19 emergency. In this way, we reduced below 1% the needs for travels and access to health facilities for patients, and zeroed travels of health professionals. This experience can provide a viable alternative for many outpatient services, avoiding their closure with the consequent impact not only on patients’ health but also economical on professionals and facilities.

The current study has limitations but also strengths. It has high ecological validity: real life, a whole institute, over 1,200 interventions; it is unique: the pandemic allows to study emergency situations, the sudden total change of all activities offers insight on feasibility and acceptability in these circumstances. There are risks of selection bias: patients feeling urgent need for consultations, or more severe cases could have been more prone to telemedicine; the digital divide (no available technology, Internet connections or digital knowledge) can have precluded a specific population to access the services; some patients cancelled the session because they did not feel comfortable in the preparation phase (Table 1). Moreover, patients accessing telemedicine could have been more inclined to technology and/or worried for their clinical conditions: this could have an impact on patients’ satisfaction. Future studies with longer follow-up period will provide more complete data and will allow to check the effectiveness of the services provided in telemedicine.
Conclusion

Telemedicine is feasible and allows to keep providing outpatient services with patients’ satisfaction. In the current pandemic, this experience can provide a viable alternative to closure for many outpatient services while reducing to a minimum the need of travels and face-to-face contacts.

Acknowledgments

We want to thank all our colleagues and patients in ISICO for how they are facing this difficult moment of emergency.

Fundings

No fundings were provided for this study.
References


Figure 1. (A) Evolution of outpatient services provided from January 7th, 2018 to March 28th, 2020. Vertical lines refer to the start of observation periods: COVID-19 emergency (February 24th), start of telemedicine services (March 16th). Sudden and important changes (decrease and increase, respectively) can be seen, with a slight delay for consultations. Grey: total of services; blue consultations; orange physiotherapy. (B) Descriptive analysis of the observations performed through a polynomial function of 3rd degree. (C) Evolution during the days of services (grey), consultations (blue) and physiotherapy (orange) in COVID-19 and telemedicine phases.

Table 1. Differences between usual (consultations and physiotherapy) and telemedicine (teleconsultations and telephysiotherapy) interventions.

Table 2. Average variations (ANOVA) in services provided in the studied phases, including consultations and physiotherapy subgroup. During CONTROL and COVID only usual consultations and physiotherapy were provided, while during TELEMED only teleconsultations and telephysiotherapy – see text for more details.