# Telemedicine, diabetes and endocrinologic diseases in the COVID-19 era: the patients' point of view from a high impacted area.

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## *Abstract*

**Background:** The effectiveness of telemedicine has been widely investigated, also in a diabetologic setting. Available evidence support an important role of telemedicine in emergency times, like the present COVID-19 outbreak.

**Objective:** The aim of the study is to evaluate the feasibility and patient satisfaction associated with virtual visit use in an outpatient diabetology and endocrinology unit in Pavia, Italy, during the present COVID-19 pandemic.

**Methods:** We submitted a satisfaction questionnaire to each patient who underwent a televisit.

**Results:** 51 patients accepted to answer our questionnaire. The majority of them didn't find any difficulty in using the informatic system, recognized a value of telemedicine in preventing COVID-19 contagion, and considered the tele-visit useful.

**Conclusions:** Our results show that patients were overall satisfied of this new approach. Telemedicine, also in a diabetologic and endocrinologic setting, can be of help in providing continuing healthcare, while keeping health providers and patients safe during COVID-19 pandemic.

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# Original Manuscript

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**Running Head:** Telemedicine during COVID-19: patients' view

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**ABSTRACT**

Background: The effectiveness of telemedicine has been widely investigated, also in a diabetologic setting. Available evidence support an important role of telemedicine in emergency times, like the present COVID-19 outbreak.

Objective: The aim of the study is to evaluate the feasibility and patient satisfaction associated with virtual visit use in an outpatient diabetology and endocrinology unit in Pavia, Italy, during the present COVID-19 pandemic.

Methods: We submitted a custom-made satisfaction questionnaire to each patient who underwent a televisit from the 1st of April to the 1st of May 2020. The questionnaire was proposed to 51 subjects. Furthermore, the patients were asked about their gender, age and visit reason.

Results: All patients accepted to answer our questionnaire. Their mean age was of 38 years (minimum 20, maximum 79) and most of patients were women (39). The patients resulted affected by different disease: type 1, type 2 and gestational diabetes, hypothyroidism during pregnancy, Graves' disease, Klinefelter Syndrome, Acromegaly, Cushing syndrome and hypopituitarism. The majority of them didn't find any difficulty in using the informatic system, recognized a value of telemedicine in preventing COVID-19 contagion, and considered the tele-visit useful.

Conclusions: Our results show that patients were overall satisfied of this new approach. Telemedicine, also in a diabetologic and endocrinologic setting, can be of help in providing continuing healthcare, while keeping health providers and patients safe during COVID-19 pandemic.

## INTRODUCTION

The first cases of Coronavirus disease 2019 (COVID-19) in Italy, sustained by the SARS-CoV-2 virus, were reported in late February 2020 (1). The San Matteo Hospital Foundation (Pavia, Italy) is a tertiary academic referral hospital located close to the site of the first reported outbreak of Codogno, and also relatively close to other cities in Lombardy which were among the most severely affected by the epidemic (i.e. Cremona, Bergamo and Brescia). This Hospital is the referral institution for the provinces of Pavia and Lodi and treated the highest number of COVID-19 patients in this area.

The rapid and unexpected spread of the pandemic has put both the general population and the healthcare system under severe strain, especially because of an unprecedented “tidal wave” of patients seeking hospital care all at once (2).

The wards of Internal Medicine, Infectious Disease, Anesthesia and Pneumology were immediately reinforced. Simultaneously our outpatients activities were almost completely suspended in order to concentrate the medical and nurse resources in the pivotal units and to prevent the possible contagion between patients and health workers. As a consequence, these Covid-related changes had a negative impact on the routine chronic disease care.

As the emergency situation persisted, the necessity of finding a way of restarting the medical care clearly emerged, especially for the patients requiring a close follow-up.

Among the possible mitigating strategies, telemedicine was identified as the most feasible for our diabetology and endocrinology unit. The hospital was not equipped with telemedicine services until the COVID-19 situation came out in Italy, so our patients were not accustomed with the use of this

kind of tool. Indeed, in a few days, with the technical support provided by the hospital informatics staff, a telemedicine system was deployed. In detail, with this tool the patient had the possibility to communicate with the doctors by an audio/video system and by a chat. They could upload their sanitary documents and download the visit relation written by the doctors with full respect of privacy protection laws.

The effectiveness of telemedicine has been widely investigated in the last decades. In particular, in a diabetologic setting, it was reported that these strategies can be useful, leading to clinically meaningful reduction in HbA1c with a significant satisfaction by the patients (3, 4). Nevertheless, data coming from available studies suffer from several limitations, including the high level of heterogeneity of results (which could be attributed to differences in the types of telemedicine system, the selected subjects and healthcare providers), the low statistical power and the short follow-up time (5). These considerations suggest that the results of these studies should be interpreted with caution. Up of now, only limited data on the use of telemedicine in a diabetologic-endocrinologic setting during the COVID-19 pandemic are available. These studies are mainly case reports encompassing a small number of patients, and none of them investigated patient satisfaction (6-9). Moreover, to the best of our knowledge, there are no studies addressing the efficacy of telehealth in the management of chronic disease in such situations. Nevertheless, available evidence supports an important role for telemedicine in emergency times, like a viral pandemic (10-11).

## AIM OF THE STUDY

This paper aims at evaluating the feasibility and patient satisfaction associated with virtual visit use in an outpatient' diabetology and endocrinology unit in Pavia, Italy, during the present COVID-19 pandemic.

## METHOD

The study population included all patients who underwent a diabetologic/endocrinologic tele-visit from 1st April to 1st May 2020. Our Diabetology and Endocrinology Outpatient Unit is dedicated to adult subjects, with a specific service for pregnant women with gestational diabetes and/or thyroid dysfunction during pregnancy. Almost all patients are from the Lombardy region, but a consistent percentage of them (especially among the pregnant women) are immigrants.

Telemedicine was proposed by the health-care professionals to the patients who had the most discomfort in reaching our hospital (for example pregnant women, patients who lived far-away from our clinic). We selected only patients who were already followed by our unit and excluded the first visits. From 1st April to 1st May 2020 51 tele-visits were performed. For each patient, a "Patient satisfaction score" was collected through a dedicated questionnaire, which is composed by the ten items described in Table 1. Furthermore, each patient was interviewed about the visit reason.

**Table 1:** Patient satisfaction score (The patients were asked to assign a number from 1 to 10 to the following sentences, where 1 means "I totally disagree with this sentence" and 10 means "I totally agree with this sentence"):

| | |
|---|---|
| 1. | I could easily communicate to the doctor my health-care condition |
| 2. | I did not encounter difficulties while using the system |
| 3. | I felt comfortable during the televisit |
| 4. | I think the health-care provided via telemedicine is effective |
| 5. | Given the contagion risk in the hospitals, telemedicine gave me the opportunity to take care of myself more serenely. |
| 6. | I think that telemedicine could be an opportunity to reduce the coronavirus-contagion |

| | |
|---|---|
| | risk in the hospitals |
| 7. | This televisit helped me to feel less “abandoned” |
| 8. | I think that a televisit is equivalent to a “live visit” |
| 9. | I will use telemedicine services again |
| 10. | Overall, I am satisfied with the quality of service being provided via telemedicine |

Given the nature of the study (survey) and the retrospective design, no specific ethical approval was required. All individuals who participated in the study gave approval for the publication of their anonymized data.

## RESULTS

In total, 51 patients accepted to answer to our questionnaires, 39 women (76.4%) and 12 men (23.6%). Their mean age was of 38 years (minimum 20, maximum 79). 12 (23.6%) of them was affected by type 1 diabetes (including one pregnant woman), 20 (39.3%) by gestational diabetes, 9 (17.7%) by hypothyroidism during pregnancy, 4 (7.9%) by diabetes type 2, 2 (3.9%) by Graves’ disease, 1 (1.9%) by Klinefelter Syndrome, 1 (1.9%) by Acromegaly, 1 (1.9%) by Cushing syndrome and 1 (1.9%) by hypopituitarism. The answers to the satisfaction questionnaire given by the subjects are summarized in the Table 2.

**Table 2.** Answers to the satisfaction questionnaire

| | **Number of respondents for each rating** | **Mean** | **Percentage of ratings from 8 to 10** |
|---|---|---|---|

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Item 1** | 0 | 0 | 2 | 2 | 0 | 1 | 3 | 12 | 5 | 26 | **8.6** | **84%** |
| **Item 2** | 1 | 1 | 1 | 1 | 4 | 4 | 2 | 7 | 9 | 21 | **8.1** | **72%** |
| **Item 3** | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 7 | 6 | 36 | **9.5** | **96%** |
| **Item 4** | 1 | 0 | 1 | 0 | 1 | 1 | 2 | 10 | 9 | 26 | **8.8** | **88%** |
| **Item 5** | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 6 | 3 | 39 | **9.4** | **94%** |
| **Item 6** | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 5 | 5 | 38 | **9.5** | **94%** |
| **Item 7** | 1 | 0 | 0 | 0 | 1 | 2 | 2 | 12 | 7 | 26 | **8.8** | **88%** |
| **Item 8** | 1 | 1 | 0 | 2 | 7 | 5 | 9 | 10 | 6 | 10 | **7.3** | **50%** |
| **Item 9** | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 10 | 8 | 28 | **9.1** | **90%** |
| **Item 10** | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 4 | 16 | 26 | **9.1** | **90%** |

When the questionnaire results were compared between male and female participants, similar results

were observed, with the only exception of the answers to the item #5 (9.7+-0.6 in female vs 8.7+-1.6, $p<0.05$). Similar scores were observed when patients younger and older than 50 years-old were compared.

## DISCUSSION

This is the first report regarding the use of telemedicine in a Diabetologic/endocrinologic setting during the COVID-19 pandemic in Italy. Our results showed that the patients were overall satisfied of this approach, with high percentages of patients expressing an excellent evaluation of the program. In particular they found the televisit a pleasant moment and an effective tool. Most of the subjects reported feeling less “abandoned” by the health-care system. Less than 30% of patients encountered difficulties using the system, mainly due to internet connection or other technical problems. Notwithstanding these technical difficulties, a large percentage of subjects would like to continue the follow-up trough telemedicine.

Several limitations of this study should be highlighted. Since this is a retrospective study describing our experience with telehealth during an “emergency time”, no specific criteria to select patients undergoing the questionnaire were followed, but simply all the patients undergoing a televisit were enrolled. It is indeed true that, although our study included all the patients who had undergone a televisit from 1st April to 1st May 2020, this kind of interaction was not proposed to all our patients. Each doctor had chosen the patient most suitable based on personal judgment. There was a certain preference toward younger subjects with greater technological skills. This selection could represent a bias, and probably has led us to overestimate the feasibility of telemedicine in this subset of patients. Moreover, this study describes the result obtained in a small sample of patients enrolled during an extremely particular time and setting (during the hardest weeks of the COVID-19 pandemic in the most severely affected region of Italy). For this reason, it is hard to generalize these results to larger

populations and to more standard situations. Nevertheless, some clear indications emerged. Even if a televisit is not considered equivalent to a traditional visit and some subjects encountered some technical problems, a large part of patient was substantially satisfied. It seems that the emergency situation could bring a greater acceptance of this new modality, both from the patient and from health providers, when compared with not-emergency situation.

Telemedicine is certainly appropriate for minimizing the risk of COVID-19 transmission. This solution has the potential of avoiding direct physical contact, providing continued care to the patients and ultimately reduce morbidity and mortality during COVID-19 outbreak. Indeed, diabetic patients, one of the main patient categories included in our study, are at higher risk of COVID-19 induced complications (12).

Our data also suggest that the use of telemedicine could reduce the impact of the present pandemic on psychological well-being of the population, especially for chronically ill patients. Moreover, our study included a sensitive category, pregnant women, who are living a time that should be joyful, with particular anxiety. The use of telemedicine can convey a sense of closeness and support to our patients.

This hypothesis has to be confirmed by further studies, which will hopefully include more subjects and allow a direct assessment of important goals like clinical disease control, psychological evaluation of included subjects and technical feasibility.

## CONCLUSION

The results of our study suggest that telemedicine can be of help in providing continuing healthcare, while keeping health providers and patients safe during COVID-19 pandemic, also in a diabetologic and endocrinologic setting. Further studies, including a more diverse and wide population, are needed to demonstrate that telemedicine is a feasible tool for routine, daily endocrinological and

diabetological outpatient activity.

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# Supplementary Files