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Short-term outcome associated with remote evaluation (telecardiology) of patients with cardiovascular diseases during the COVID-19 pandemic



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ABSTRACT

Introduction: During the recent COVID-19 outbreak, Italian health authorities mandated to replace in-person outpatient evaluations with remote evaluations.

Methods: From March 16th 2020 to April 22th 2020, all outpatients scheduled for in-person cardiac evaluations were instead evaluated by phone. We aimed to report the short-term follow-up of 345 patients evaluated remotely and to compare it with a cohort of patients evaluated in-person during the same period in 2019.

Results: During a mean follow-up of 54 ± 11 days, a significantly higher proportion of patients evaluated in-person in 2019 visited the emergency department or died for any cause (39/391, 10% versus 13/345 3.7%, $p = 0.001$) and visited the emergency department for cardiovascular causes (19/391, 4.9% versus 7/345, 2.0%, $p = 0.04$) compared to 2020. No cardiovascular death was recorded in the two periods. To an evaluation with a satisfaction questionnaire 49% of patients would like to continue using remote controls in addition to traditional ones.

Conclusion: These findings may have important implications for the management of patients during the current COVID-19 pandemic because they suggest that remote cardiovascular evaluations may replace in-hospital visits for a limited period.

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1. Introduction

During the recent COVID-19 outbreak, Italian health authorities mandated to replace in-person outpatient activities with remote evaluations. Although this strategy aimed to minimize the risk of dissemination [1], the implications for the health of patients with cardiovascular diseases may potentially be unfavorable. We report our experience with remote evaluation (telecardiology) during a 2-month period following the COVID-19 outbreak and compared the short-term follow-up of patients evaluated remotely with that of patients evaluated in-person during the corresponding 2019 period.

2. Methods

The study was conducted in the cardiology department at the Santa Maria del Carmine hospital of Rovereto, province of Trento, northern Italy. From March 16th 2020 to April 22th 2020, all outpatient activities were suspended and the department was converted into a COVID-19 department. While most of the healthcare workers were employed to care for COVID-19 patients, a small group of doctors and nurses were dedicated to telecardiology. All outpatients scheduled for in-person evaluations were contacted by phone by a cardiologist who screened the presence of symptoms, NYHA class, compliance to therapy, vital signs such as self-measured blood pressure and pulse, body weight. . . Moreover, the reports of all exams, emergency department (ED) visits, hospital admissions and alive status were checked using a hospital management software that is unique for the entire Trento province. Patients scheduled for non-invasive cardiac exams were also contacted to determine appropriateness and urgency. Ninety-six % of patients with cardiac implantable electronic devices (CIEDs) such

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as pacemakers, implantable cardioverter defibrillators and loop recorders remote were already followed-up by telecardiology with home monitoring devices thanks to a program that started in 2016 [2] (Fig. 1).

We reported the number and type of remote evaluations during the study period and the ensuing medical decisions, also in relation to first or follow-up visit. We also compared the short-term follow-up (until May 26th) of patients evaluated remotely in 2020 and of those evaluated in-person in the same period in 2019. The primary end-point included ED visits and all-cause death, the secondary ED visits and death for cardiovascular causes.

Data are reported as mean (\pm standard deviation) or counts (%) and were compared using the Log-rank test.

3. Results

During the study period, 345 patients (57% males, mean age 68 ± 15 years) that were scheduled for an in-patient visit were evaluated remotely. Reasons for evaluation are: arrhythmias 38%, coronary artery disease 18%, heart failure 18%, general cardiology 16%, valvular heart disease 9%, pediatric cardiology 1% of cases. The median time per phone interview was 14 ± 4 min. In 198 patients (57%) ≥ 1 decisions were taken: in 3 (1%) an admission for coronary angiography or ablation was programmed, in 50 (14%) drug therapy was modified, in 68 (20%) an instrumental exam was prescribed; in 137 (40%) an in-person evaluation was scheduled in the following months. In only one patient urgent admission was suggested.

About 345 telecardiology visits 98 were first visits and 247 control visits. The first visits had an average age of 63 ± 18 years, the controls 70 ± 14 ($p < 0.001$). The first visits had a higher percentage of women (52%) than the control group (41% - $p = 0.07$ NS). In the group of first visits in 40 cases (41%) an evaluation was rescheduled within 6 months, while in the control group only in 16 (6%)

of cases a re-evaluation was rescheduled in the short term (within 6 months).

We also evaluated 203 patients scheduled for non-invasive cardiac exams (echocardiography, $n = 142$; stress echocardiography, $n = 10$; exercise testing, $n = 32$; 24-hour ambulatory ECG monitoring, $n = 12$): in only 28 (14%) the exam was considered urgent and was performed within few days. Among the remaining patients, the exam was rescheduled in 103 (51%) while it was considered inappropriate or unnecessary in 72 (35%).

Finally, we evaluated 1,418 transmissions from the 2,093 patients with CIEDs. While 88% of transmissions were managed by the specialist nurse, 12% required medical review and in 55 (2% of patients with CIEDs that are followed-up remotely) an in-person evaluation was scheduled, urgently in 5 (including 3 for newly diagnosed atrial fibrillation).

During a mean follow-up of 54 ± 11 days, 13 patients (3.7%) met the primary end-point: 7 (2.0%) visited the ED for cardiovascular problems (acute coronary syndrome in 2, heart failure in 3, atrial fibrillation in 2) and 3 were admitted, 5 (1.6%) visited the ED for non cardiovascular causes and 1 (0.3%) for COVID-19. The rate of cardiovascular events was higher in the control group than in the first visits group (7 vs 0), while the number of non-cardiovascular events was 3 in both groups. Compared to 2020, a significantly higher proportion of patients evaluated in-person in 2019 visited the ED or died for any cause (39/391, 10% versus 13/345 3.7%, $p = 0.001$) and visited the ED for cardiovascular causes (19/391, 4.9% versus 7/345, 2.0%, $p = 0.04$) during follow-up. No cardiovascular death was recorded in the two periods.

Table 1 summarizes patients' replies to the questionnaire administered after one month of remote visit. Judgments regarding the clarity of information received from the center and the satisfaction of the remote visit were generally positive. 49% of patients would like to continue using remote controls in addition to traditional ones.

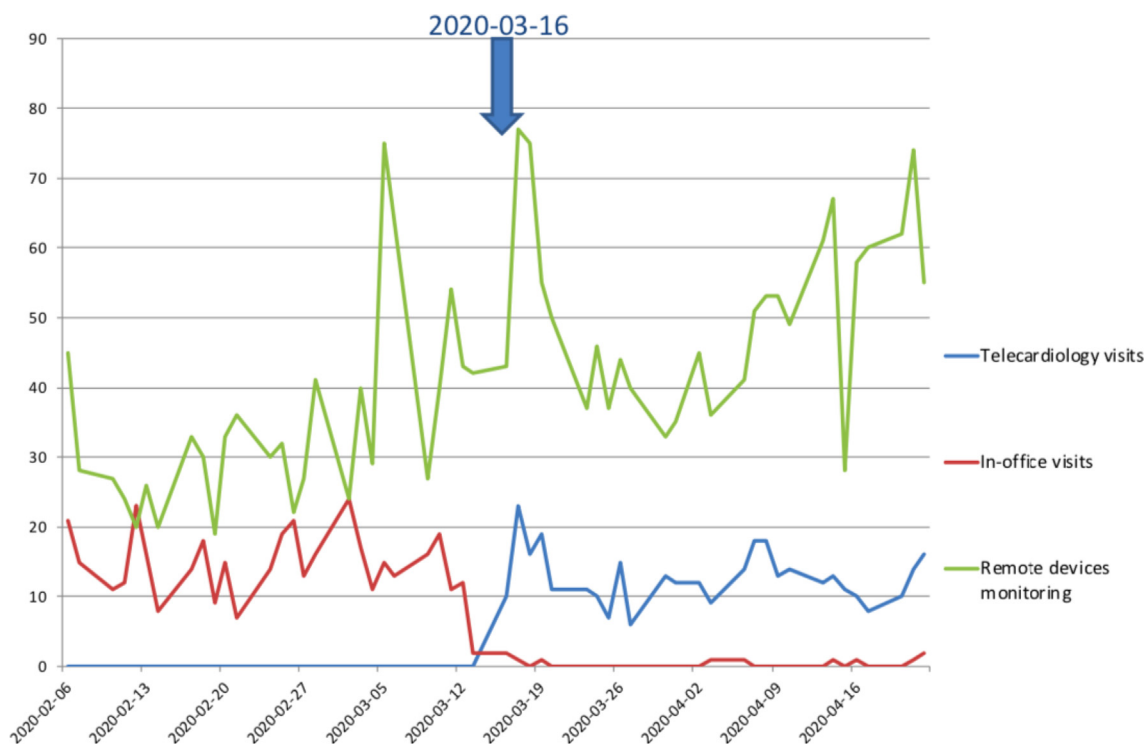


Fig. 1. Cardiological evaluation and remote device controls during the study period.

Table 1

Patient feedback after one month from remote visit. (1. Very negative, 2. Negative, 3. Neutral, 4. Positive, 5. Very positive).

		Mean ± St. Dev.	Score 1 (%)	2	3	4	5
Relationship with the center	Clarity of the telephone management of the remote visit	4.7 ± 0.7	0%	2%	4%	19%	75%
	Clarity of information received during remote visit	4.6 ± 1.1	4%	4%	5%	17%	70%
Overall satisfaction	Satisfaction with remote visit organization in COVID period	4.4 ± 1.0	4%	1%	9%	28%	58%
	In the COVID period would you come to the Hospital for the visit?	YES = 17%	NO = 75%				I don't know = 8%
	Do you want to continue to use remote control in addition to traditional in-office visit for the following controls?	YES = 49%	NO = 45%				I don't know = 6%

4. Conclusions

During the COVID-19 outbreak, risk of infection and shortage of hospital resources required cardiac evaluations of our outpatients to be carried out remotely. Other experiences in Europe have also been launched to ensure continuity of care in the outpatient setting, such as the mHealth TeleCheck-AF project, which has developed an APP for the management of patients with atrial fibrillation [3]. During a short-term follow-up, we observed a lower proportion of patients requiring urgent ED evaluations compared to those evaluated in person during the corresponding 2019 period and no cardiovascular deaths. These findings suggest that the strategy of replacing in-hospital visits with “telecardiology” may be effective in the short-term management of patients. However, multiple studies reported that many Italian patients with acute cardiovascular conditions did not seek urgent medical attention during the COVID-19 outbreak [4–6] and this may partly explain the lower number of ED admissions we observed in 2020 than in 2019. For this reason, we believe that a longer follow-up is needed before drawing definite conclusions on the impact to the health of patients with cardiovascular diseases of the modifications of clinical practice that became necessary after the COVID-19 outbreak.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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