Longer-term results of the cardiology e-consult program in patients with heart failure

Consulta electrónica (e-consulta) para pacientes con insuficiencia cardiaca. Resultados a largo plazo

To the Editor,

Telemedicine has been shown to improve access to health care by overcoming geographical inequities and adapting to situations such as the current coronavirus disease 2019 (COVID-19).[1] Although the available evidence is scarce, we believe that telemedicine, in addition to improving the efficiency of health care systems, could be associated with better health outcomes.

Multidisciplinary programs that integrate different levels of care represent the best model for the management of patients with heart failure (HF).[2] Telemedicine has been shown to be effective in the clinical follow-up of these patients and contributes to their clinical stability by the optimization of treatment and the early identification of decompensation, thereby reducing hospitalizations and mortality.[3] The integration of electronic medical records across all health care levels allows clinical information to be shared, thus improving the organization of demand for care.[4] This aspect is particularly relevant in relation to chronic diseases characterized by frequent decompensations, such as HF.

A recent publication described the impact of incorporating a universal electronic consultation program (started in 2013) on waiting times in care and health outcomes (e-consultation).[5] This initiative was the first step in the outpatient care process for patients referred to a cardiology service by primary care (PC) physicians using an integrated electronic medical record. The results of e-consultation were compared with those of the previous period of exclusive face-to-face consultation (from 2008 to 2012). There was a significant reduction in waiting times, with a lower rate of hospital admissions, emergency department visits, and mortality in the year following the consultation.[5] We proposed that e-consultation could lead to better and faster risk stratification, which could in turn allow treatment optimization. This proposal was partly confirmed by our findings.

We conducted an observational retrospective quality-of-care study that analyzed the information recorded in the management accounting unit of our health area. The information obtained was anonymized and did not involve any risk to patients. Informed consent was waived due to the large number of patients and the length of time involved.

The aim of this letter was to describe the clinical characteristics of HF patients referred for consultation by PC physicians, as well as the impact of implementing e-consultations on waiting times and health outcomes in patients with a history of HF. We used interrupted time series analysis to investigate the impact of e-consultation on consultation waiting times, emergency room visits, hospital admission, and mortality 1 year after consultation.[6]

A total of 10.8% of patients referred for consultation had a previous diagnosis of HF, with a decreasing trend between 2010 (11.2%) and 2019 (8.6%). The characteristics of patients with HF referred for consultation by PC physicians are shown in table 1. In general, patients were elderly, had a high prevalence of comorbidities (more than 50% had atrial fibrillation), had a low likelihood of their demand for care being resolved via e-consultation (9.2%), and had a high need for successive consultations during the initial face-

Table 1
Characteristics of patients with heart failure under each consultation model

	Total	Face-to-face one-stop model	E-consultation model	*P*
Patients, n	5115	2310	2805	
Women, %	51	51.1	51.4	.816
Age, y	77.5 ± 9.6	76.4 ± 9.3	78.4 ± 9.7	< .001
Clinical history				
Hypertension, %	78.8	77.3	80.1	.015
Diabetes mellitus, %	33.4	33.4	33.4	.962
Ischemic heart disease, %	21.1	22.6	19.9	.020
Atrial fibrillation, %	51.3	49.1	53.1	.004
Cerebrovascular disease, %	9.9	10.0	9.9	.956
Peripheral artery disease, %	7.4	7.0	7.7	.297
Waiting time in CS, d	10 [5-27]	27 [10-76]	7 [5-12]	< .001
Number of tests in CS	1 [0-3]	2 [0-4]	1 [0-1]	< .001
Number of emergency room visits	4 [1-8]	6 [3-10]	3 [1-6]	< .001
Hospital admissions due to CV reasons (first year), %	14.0	14.6	13.5	.266
Heart failure, %	11.2	12.3	10.3	.032
Ischemic heart disease, %	1.9	2.0	1.9	.364
Valvular heart disease, %	1.6	1.8	1.4	.041
Atrial fibrillation, %	0.9	0.7	1.1	.033
Total mortality (first year), %	8.6	8.4	8.8	.575
Heart failure	15.2	14.1	17.1	.021
Cancer, %	11.9	11.8	11.9	.955
Ischemic heart disease, %	9.1	9.1	9.1	.947
Valvular heart disease, %	6.2	5.8	6.7	.015
CV mortality (first year), %	4.4	4.6	4.2	.500

CV: cardiovascular; CS: cardiology service.
Unless otherwise indicated, values are expressed as mean ± standard deviation or median [interquartile range].

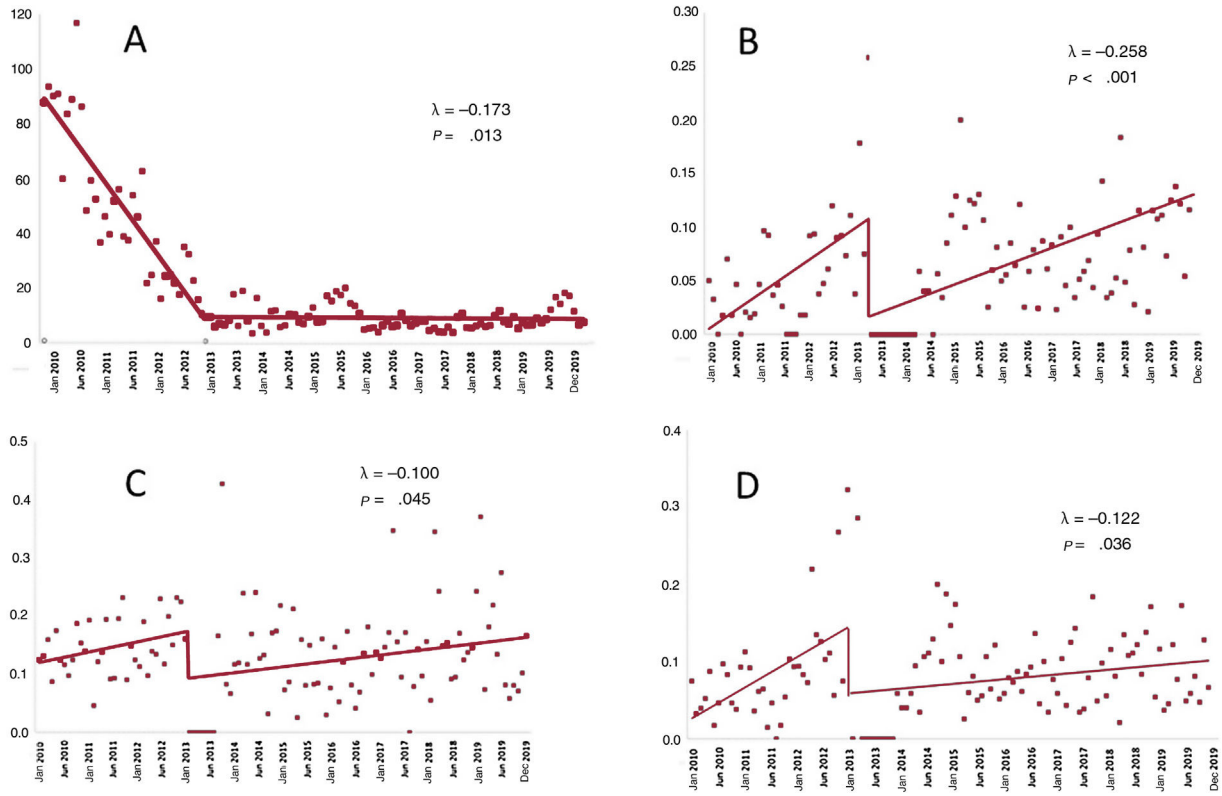

Figure 1. Interrupted time series analysis of the implementation of the e-consultation program: waiting time (A), emergency room visits (B), hospital admissions (C), and mortality (D). There was a significant reduction in the 4 variables analysed after the implementation of e-consultation.

to-face consultation period (60.3%) and after the implementation of the e-consultation program (72.7%). The table also shows the progress of the patients with a previous diagnosis of HF (need for emergency room visits, hospital admission, and mortality 1 year after consultation). The interrupted time series analysis showed a sharp reduction in waiting times at the start of the e-consultation program. Waiting times had already been decreasing in previous years under the 1-stop approach to consultations. There was also a significant reduction in emergency room visits, hospital admissions, and mortality (figure 1). The increased rate of emergency room visits by patients with HF observed during the in-person period of 1-stop consultations underwent a sharp fall (9.9%; 95% confidence interval [95%CI], 5.9%-13.9%) after the implementation of e-consultation, even though the previous annual growth rate remained unchanged. There was also a significant reduction in the hospital admission rate (10.0%; 95%CI, 5.1%-14.9%) and mortality (12.2%; 95%CI, 6.4%-18.0%) after the implementation of e-consultation. This rate remained relatively stable after its implementation.

These results were obtained in a large series of patients with a diagnosis of HF. They show that introducing an e-consultation program to manage consultations requested by PC physicians is safe and leads to reduced waiting times because of the significant reduction in the need for urgent care, hospital admissions, and mortality in a group of patients at high risk of clinical instability. The effect of the implementation of this e-consultation program did not prevent a subsequent increase in the annual rate of urgent consultations, hospital admissions, and mortality. Nevertheless, the increase was smaller than that observed during the face-to-face consultation period, especially regarding the risk of hospital admission and mortality. Our results shows that the implementation of e-consultation to manage the demand for care in HF patients improves risk stratification and leads to faster patient treatment by reducing waiting times.

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AUTHORS' CONTRIBUTIONS

All authors participated in data collection, data analysis, reviewing the results, and drafting, revising, and giving final approval to the manuscript.

CONFLICTS OF INTEREST

None declared.

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Aorta Code: a pilot study of a health care network for patients with acute aortic syndrome

Código Aorta: proyecto piloto de una red asistencial para la atención al paciente con síndrome aórtico agudo

To the Editor,

Acute aortic syndrome (AAS) is a rare condition associated with high mortality.[1]

The Aorta Code project was designed to create a dedicated health care network for patients with AAS. The project had 3 main goals: to increase vigilance and improve the diagnosis of AAS, to expedite the transfer of patients to the network's aortic referral center, and to provide optimal treatment through a highly specialized team.

The Aorta Code network is formed by 4 hospitals from the autonomous community of Madrid and the area's medical emergency response service (SUMMA-112). It provides coverage to a population of 1.04 million inhabitants.

The project set-up included specialized training at the hospitals' emergency departments and SUMMA-112 and the development of a diagnostic and a treatment algorithm based on clinical practice guidelines.[2] A highly specialized AAS care team formed by 2 cardiologists, 2 cardiac surgeons, and 2 vascular surgeons (the Aorta Team) was created to take responsibility for decisions on incoming patients and their treatment. The project was approved by the relevant health authorities in Madrid and the local ethics committee at *Hospital Clínico San Carlos*. Informed consent was obtained from all patients involved.

The full Aorta Code protocol has been published elsewhere.[2] In brief, as soon as a patient is diagnosed with AAS, the emergency responders activate the Aorta Code via a dedicated telephone line. The coordination committee at SUMMA-112 dispatches a unit for the urgent transfer of the patient to the referral hospital, where their case is assessed by the members of the Aorta Team, who decide on the definitive treatment.

To evaluate the Aorta Code project, we compared outcomes from the 18 months before the project was implemented (care-as-usual period) with outcomes from the first 2 years of its implementation (March 15, 2019 to March 15, 2021).

Categorical variables are expressed as number and percentage and were compared using the chi-square or Fisher exact test. Quantitative variables are expressed as mean ± standard deviation or median [interquartile range] and were compared using the *t* test. Statistical significance was set at $P < .05$ and the statistical analyses were performed in STATA (version 12.0).

The AAS code was activated 59 times during the 2 years analyzed (this included a 3-month period in which the service was interrupted due to the COVID-19 pandemic). AAS was confirmed in 42 patients (table 1); 5 patients did not have aortic disease, 8 had nonacute aortic disease, and 4 had a ruptured abdominal aortic aneurysm.

Following the implementation of the Aorta Code project, the number of patients diagnosed with AAS doubled (from a mean of 1 patient a month to 2 patients a month). No significant differences were observed between the groups for the presence of risk factors, imaging findings, or clinical presentations (table 1). Transfer times to the hospital were also significantly reduced (table 2). There were no significant differences between the groups for time from first symptom to diagnosis or time from diagnosis to surgery. Preoperative AAS complication rates also decreased (table 2).

The number of surgeons treating patients diagnosed with AAS fell from 13 (7 cardiac and 6 vascular surgeons) during care-as-usual to 4 (2 cardiac and 2 vascular surgeons) during the project. Sixty percent of patients with type A AAS were treated with the Bentall-De Bono procedure during the care-as-usual period. This percentage fell to 42% after implementation of the project, as 58% were treated with aortic root repair surgery. There was also a relative increase of 80% in the number of complete aortic arch procedures performed ($P = .09$) (table 2). The project achieved a relative reduction of 28% in surgery mortality rates compared with care-as-usual, although the difference was nonsignificant (risk difference, 8.5%; odds ratio = 0.64; 95% confidence interval, 0.15-2.6; $P = .559$). There were no differences between the groups in overall mortality.

The clinical presentation of AAS is variable and often leads to diagnostic errors.[3] Implementation of the Aorta Code project improved the knowledge and skills of emergency service physicians and increased the number of AAS diagnoses. Although management of acute aortic disease by a small team of dedicated surgeons at a limited number of specialized centers has been found