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Scientific letter

Real-world Outcomes of a Telemonitoring Program (telEPOC) for Patients With COPD With Frequent Hospital Readmissions

Resultados en la vida real de un programa de telemonitorización (telEPOC) para pacientes con EPOC reingresadores

Dear Editor,

Chronic obstructive pulmonary disease (COPD) exacerbations are a significant public health issue. In Spain, they account for 1%–2% of all emergency room visits and nearly 10% of medical admissions. The economic burden of hospital admissions represents more than 50% of the total direct cost. Furthermore, exacerbations are the main determinants of morbidity and mortality in patients with COPD. They are associated with a decline in lung function, reduced physical activity, diminished quality of life, and increased mortality.[1–3]

Exacerbations do not affect all patients equally; there is a high-risk subgroup characterized by complexity and frequent admissions, for whom guidelines recommend a higher level of care. In fact, the strongest predictor of a future exacerbation is having experienced 1 admission in the previous year.

In recent years, technological advancements have led to the development of numerous portable "wearable" devices that offer high-quality telemonitoring, yet despite numerous clinical trials, a recent survey in Spain revealed that only 40% of healthcare professionals incorporate telemonitoring into their clinical practice.[4]

In our setting, Osakidetza, the public health system of the Basque Country, implemented a corporate telemonitoring program in 2015 for COPD patients with more than 2 hospitalizations in the previous year or more than 3 over a period 2 years, and this program, known as "telEPOC," has now been integrated into routine practice in 4 hospitals. Patients excluded from the program include those without social support, those unable to use the devices, or those living in long-term care facilities. The telemonitoring device consists of a tablet with specialized software, including a symptom questionnaire and physiological data collection (oxygen saturation, heart rate, temperature, steps/day, and respiratory rate). Patients in the telEPOC program submit daily reports (once a day, 365 days a year) which are securely transmitted and integrated into the unified electronic medical record (Fig. 1). This information is classified according to pre-established individualized alarm levels and reviewed by a nurse who determines the appropriate course of action.[5]

To evaluate the real-world outcomes of including COPD patients in the program, we conducted a prospective study analyzing the number and duration of hospital admissions among patients enrolled in the program at our center during their first 2 years post-enrollment. The Biomedical Research Ethics Committee of Euskadi (código CEI E10/30) approved this study. All participants signed informed consent.

The program was offered to 143 patients, of whom 24 declined to participate after the initial visit. A total of 119 patients were included, and 106 completed 2 years of follow-up. The average age was 71 years, and the population was predominantly male. Baseline characteristics are presented in Table 1.

Two-year outcomes revealed a reduction in admissions from 2.5 ± 0.9 to 0.99 ± 0.9 ($p < 0.001$) in the first year after enrollment and 0.65 ± 0.9 ($p < 0.001$) in the second year post-enrollment. The number of hospitalized days decreased from 26.5 over the previous 2 years to 17.4 in the 2 years following enrollment ($p = 0.003$). Moreover, 39% of patients experienced no hospitalizations in the 2 years following enrollment. Our analysis of baseline factors to identify which patients benefited most from the program showed that participation in a rehabilitation program and a lower CAT score was associated with no hospitalizations in the following year (Table 1).

Although many pilot studies on telemonitoring have been published, few have been integrated into routine clinical practice. Our results confirm the findings from the validation study of the telEPOC project, demonstrating its utility in reducing hospitalizations during the first year of follow-up in patients with frequent admissions. These findings are consistent with data from other groups, although not all authors found a reduction in admissions.[6,7]

A recent meta-analysis reported a reduction in COPD exacerbation-related admissions with an RR of 0.74.[7] A recent Cochrane review, including 29 studies, also concluded that telemonitoring achieves a moderate reduction in readmissions.[8]

Integrating telemonitoring data into unified electronic medical records enriches patient care, facilitates coordination across different levels of care, enables early detection of exacerbations, supports continuous follow-up, and shifts care to the patient's home, thereby avoiding unnecessary travel. However, it remains unclear which patients benefit the most from these programs. Our data showed that only participation in a rehabilitation program and better baseline quality of life were associated with greater program success, reinforcing the need for these programs to be multi-component, as described by other authors. Furthermore, various studies underline the importance of good acceptance of telemonitoring among patients and their families.[6]

Limitations of this study include a selection bias, as it enrolled a higher proportion of men than women and excluded patients with social issues or difficulties in understanding telemonitoring, who are usually at a higher risk of readmission. Since our study was conducted in a real-world setting without a control group, we could not measure potential overuse of antibiotics and/or corticosteroids. The definition of exacerbation was based on subjective symptoms, so incorporating newer, more objective methods to measure exacerbation severity may help mitigate any potential overtreatment.

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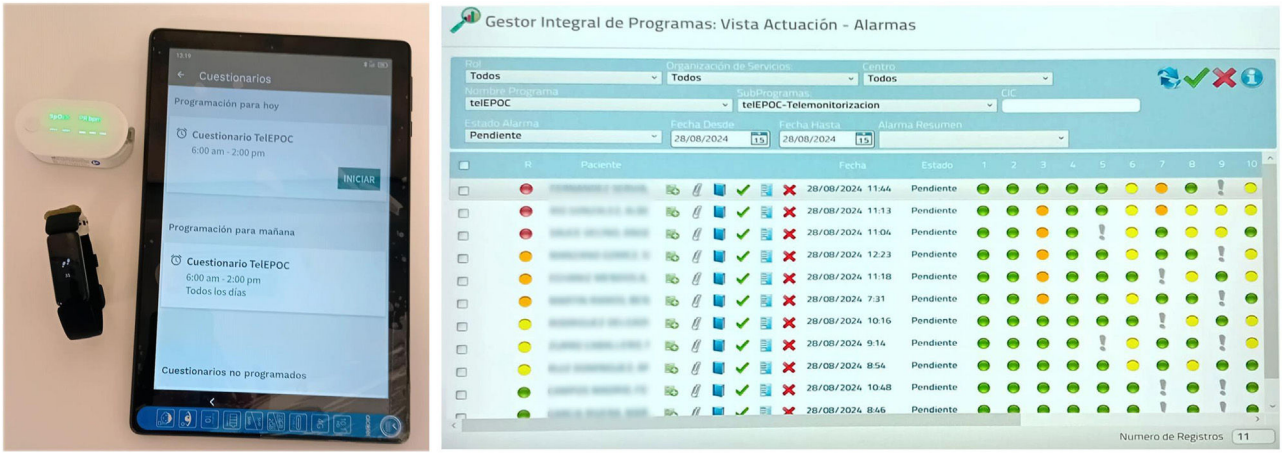

Fig. 1. Devices and telEPOC alarm vision in electronic health records.

Table 1
Characteristics of patients by hospital readmission status.

	N = 106	Patients without admissions *N* = 42	Patients with one or more admissions *N* = 64	
Age	71.3 ± 8	70.8 ± 7	71.5 ± 8	NS
Male	83	31	50	
BMI	27.8 ± 6	28.4 ± 5	27.7 ± 7	NS
Current smoking	16	6	10	NS
MRC Dyspnea	2.4 ± 1	2.1	2.6	NS
FEV1%	42 ± 16	42.6 ± 18	41.2 ± 13	NS
TLCO%	56 ± 21	65 ± 20	52 ± 19	$p = 0.06$
Heart disease	54	20	32	
BODE	4.8 ± 2	4 ± 1	5 ± 2	NS
CAT	19 ± 7	15 ± 7	22 ± 6	$p < 0.01$
CT				NS
Emphysema	40	14	26	
Bronchiectasis	26	14	12	
Both	22	8	14	
NIV	17	8	9	NS
Rehabilitation	17	11	6	$p > 0.01$

BMI: body mass index; BODE: includes BMI, airflow obstruction, dyspnea, and exercise capacity; CAT: COPD Assessment Test, evaluating symptoms related to the disease; CT: computed tomography; FEV1%: forced expiratory volume in one second; MRC Dyspnea: Medical Research Council Dyspnea Scale; NIV: non-invasive ventilation; NS: not significant; TLCO%: diffusing capacity for carbon monoxide.

On the other hand, telemonitoring does not prevent disease progression, so palliative care needs have increased over the 9 years of the program. During this period, 55 patients have died from various causes. The emergence of comorbidities, primarily cardiac, complicates management and increases the need for in-person visits.

Furthermore, we could not measure the potential impact on the workload of healthcare professionals, although we do have a nurse who dedicates 80% of their time to this program. Nevertheless, previous studies by our group have shown that this program is cost-effective.[9]

In conclusion, telemonitoring COPD patients with multiple hospital readmissions with the telEPOC program is effective in reducing hospital admissions and the length of hospital stays, at least during the first 2 years after implementation.

Informed consent

All authors have agreed to the publication of the manuscript.

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Authors' contributions

MIP and ETH take overall responsibility for the manuscript. MIP and ETH conceived and designed the study. ETH, EEG, LGE, NMM and PSE enrolled patients and collected and compiled data. MIP and ETH analyzed and interpreted the data. EEG, LGE, NMM and PSE commented on and reviewed the report. All authors read and approved the final manuscript.

Conflicts of interest

The authors declare they have no conflict of interest.

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Milagros Iriberri Pascual*, Edurne Echevarria Guerrero, Patricia Sobradillo Ecenarro, Larraitz Garcia Echeberria, Nuria Marina Malanda, Eva Tabernero Huguet

Department of Respiratory Medicine, Cruces University Hospital, BioBizkaia Health Research Institute, Barakaldo, Bizkaia, Spain

* Corresponding author.
E-mail address: milagrosiriberri@gmail.com (M. Iriberri Pascual).