ORIGINAL ARTICLE

Impact of self-management of therapy on use of emergency health care services by patients with chronic diseases: a cohort study

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Objective: To determine whether ineffective management of therapeutic regimen is a predictor of frequent use of health care resources and poor quality of life in patients with chronic illnesses.
Methods: Prospective cohort study. Two cohorts were formed in 2007 on the basis of presence or absence of ineffective management. The patients were evaluated for 12 months to assess quality of life, adherence to therapy, and use of health care resources.
Results: Of 302 patients included, 167 (55.29%) were in the ineffective-management cohort. In addition to poor adherence to therapy, such patients tended to be men, hypertensive, and on several medications. The risk of readmission in this cohort was nearly 4-fold higher during the 12-month period (odds ratio, 3.72; 95% CI, 2.19-6.32; *P*<.0001) according to a 10-item scale (DecaMIRT). The patients with low adherence to therapy had quality of life scores that were significantly lower by a mean of more than 5 points (95% CI, 2.60-7.258; *P*<.05).
Conclusions: In patients with chronic diseases, effective management of therapeutic regimen is associated with quality of life and a different pattern of use of health care resources. The DecaMIRT scale proved valid for measuring adherence to therapy and can help improve how persons with chronic diseases are attended in the emergency department. [Emergencias 2013;25:353-360]

Keywords: Patient adherence. Self-care. Emergency health services. Quality of life. Chronic disease.

Introduction

Since Haynes and Sackett in the 70s determined that half of patients with chronic diseases do not adhere to their treatment regimes[1], the situation seems not to have changed too much and this suggests that chronic patients do not benefit much from pharmacological progress and the development of health systems[2]. The WHO has provided evidence of severe gaps in addressing chronic conditions, especially in promoting self-care[3], and the problem becomes increasingly greater with increasing incidence of chronic conditions, as in Spain[4-6].

The impact of chronic disease on patient attendance in hospital emergency departments (EDs) is well documented, as well as its negative effect on the management of beds[7]. The ED becomes a buffer unit with a multipurpose function[8] attending not only its segment of patients, but also other categories[9]. Chronic patients are difficult to manage in any setting, especially in the ED, where their complexity and age is higher than those who come to the hospital for scheduled vis-

its[10] and lack of adhesion is one of the main reasons for readmission to hospital[11].

Therefore, we wished to assess the influence of ineffective management of therapeutic regimen (IMTR) in patients with chronic disease attending the ED. The main objective of this study was to determine the association between IMTR and ED use, as well as the relationship of IMTR with sociodemographic factors, complexity in the chronic process and its impact on the quality of life.

Method

We performed a prospective observational cohort study, conducted in the ED of Hospital Virgen de la Victoria in Malaga, a specialty 700-bed hospital. The ED observation area is divided into two spaces, one with 16 chairs, and the other with 24 beds. The study included adult patients with chronic disease and prolonged treatment regimes, occupying a bed, diagnosed with at least one of the following chronic processes: arterial hypertension (HTN), diabetes mellitus (DM) type I or II, heart failure (HF) and chronic obstructive pulmonary disease (COPD). We excluded patients with a stay of less than 8 hours, cognitive impairment (Pfeifer test > 3), patients with problems understanding speech or language, those not wishing to participate, and those with poor prognosis (life expectancy of less than 6 months) or patients with acute psychiatric disorders.

For an alpha risk of 0.05, an estimated prevalence of IMTR in chronic patients in our setting of 36%[7,10], the sample size required was 194 subjects in order to detect a relative risk of readmission of at least 1.5 and 60% readmission rate in the exposed group[12]. Given the expected loss of patients due to mortality or deterioration in levels of independence which would impede self-management of treatment, we increased the sample size by 60%, so the final sample comprised 310 subjects.

The variables evaluated were age, sex, type of chronic condition (HT, DM, HF and COPD), number and type of drugs being taken at the time of admission, the presence of poly-medication ≥5 drugs) and the presence of IMTR on admission. As outcome variables we included admission to ED observation area, intensive care unit (UCI) or ward hospitalization for an event related to the chronic process in the study period, the use of urgent/emergency care services, quality of life and perceived health status, measured by the questionnaire SF-12 (consisting of 12 items: physical function, social function, physical role, emotional role, mental health, vitality, bodily pain and general health).

IMTR was assessed using three instruments, Batalla test[13], Morisky-Green test[14], and the newly created Deca-IMTR, based on nursing outcomes classification (NOC), whose validity has been demonstrated[15] with inter-observer reliability of 0.87 and internal consistency by Cronbach's alpha 0.9316. Deca-IMTR is so-called because it has 10 indicators of capabilities of the patient - from knowledge of the process to action of the patient in emergency situations. These were assessed by the nurse in a direct way, using a 5-point Likert scale (1- none to 5- extensive) levels (Table 1).

The recruitment of cohorts lasted from March 2007 to June 2008, which, added to the 12 months follow-up, extended the study to 3 years. Data collection was carried out by the staff of the unit attached to the project, in collaboration with other professionals. A daily review was done first thing in the morning, to compare with medical records. Most of the data were taken medical history, in the process of digitization, and the plan of nursing care, except for the measurement of quality of life, carried out immediately after discharge.

The follow-up of cohorts was carried out at 6 and 12 months, by half-yearly telephone interviews, with a new determination of therapeutic management, quality of life, readmissions and utilization of health services in the study period.

Measures of central tendency and dispersion, as well as proportions, and exploratory analyses were carried out to verify data normality and symmetry (Kolmogorov-Smirnov test). For the measurement of the frequency of events, cumulative incidence and incidence density were used. A bivariate analysis was performed using Chi square and Student's t with Levene test, for independent samples with a normal distribution, or non-parametric tests Mann-Whitney, Wilcoxon test and Kruskal-Wallis test. Relative risk was estimated with 95% confidence intervals (CI). Finally, we used Kaplan-Meier curves and Cox regression proportional risk analysis.

Informed consent was obtained from all participants and data confidentiality was guaranteed. The project was approved by Research Ethics Committee, Hospital Universitario Virgen de la Victoria.

Results

The final sample comprised 304 patients. The sequence of each phase of the study is shown in

Table 1. Batalla, Morisky-Green and Deca-IMTR tests

Batalla test (adapted)*
1. Is [name of the disease] a disease for life?
2. Can it be controlled with diet and medication?
3. Cite two or more organs that can be damaged by having [disease name].

Morisky-Green test
- Do you ever forget to take your pills?
- Do you take them at the appointed time?
- When you feel well, do you sometimes stop taking them?
- If you feel ill, do you stop taking them?

Deca-IMTR
1. Description of the process of disease
2. Description of the reasons for the therapeutic regimen
3. Description of self-care responsibilities for current treatment
4. Description of self-care responsibilities for emergencies
5. Description of the effects expected from the treatment
6. Description of the diet prescribed
7. Description of the medication prescribed
8. Description of the activity prescribed
9. Description of the procedures prescribed
10. Description of the benefits of treatment of the disease

* Adapted Jara Zozaya A, Miralles Xamena J, Carandell Jagger E. Guía de recomendaciones para la atención de los pacientes poly-medications. Govern Balear. Consellería de Salut i Consum. 2010; (consultado 22-3-2011). Disponible en http://www.caib.es/sacmicrofront/archivopub.do?ctrl=MCRST353ZI100898&id= 100898. The presence of an error indicates lack of adherence.

Figure 1, which shows that 199 patients completed follow-up, with 54% lost to follow-up. Patient characteristics are listed in table 2, divided by cohort. The global distribution by sex was 62.2% men and 37.8% women, mean age 66.9 years (12.8). Of these patients 41.1% had hypertension, 26.6% HF, a 16.7% DM and a 14.1% COPD. More than half of the patients (57.4%) were taking more than five drugs, most of them related to cardiovascular disease: angiotensin converting enzyme inhibitors (ACEI) (34%), diuretics (33.3%) and angiotensin receptor antagonists (ARA II) (21.9%). Typical patient profile corresponded to an elderly man with chronic HT, poly-medicated, difficulty handling his therapeutic regimen, poor adherence to recommendations and reduced quality of life at the functional level, linked to the physical component. Readmissions showed no differences between sexes (31.8% in men, compared to 34.7% in women, p = 0.40).

Therapeutic adherence at baseline and at 6 and 12 months, measured by Batalla test, was 29.3%, 29.6% and 25.9% respectively and measured by Morisky-Green test, it was 53.9%, 51.3% and 49.2%. Taking the Batalla test as the gold standard, Deca-IMTR showed an area under the ROC curve of 0.84 (95% CI: 0.82-0.87), with the best cut-off point at 31, with a sensitivity of 78% and a specificity of 81%. The area under the ROC curve with Morisky Green test as the gold standard test was 0.78 (95% CI: 0.75-0.81), and with a cut-off point at 29.50, with a sensitivity of 69% and a specificity of 74%, lower than those obtained with the Batalla test, so the latter was taken as the gold standard. Deca-IMTR showed adherence rates of 45.1%, 55.6% and 59.3%. Mortality in the sample was 7.2% during the whole study period and overall readmission was 7.8%.

Table 2. General characteristics of the whole sample, and by cohort

Baseline	Global	EMTR (n = 167)	IMTR (n = 137)	*p*
Sex (male) [n (%)]	189 (62.2)	88 (52.7)	101 (73.7)	< 0.001
HT [n (%)]	116 (41.1)	52 (31.1)	64 (40.7)	< 0.001
DM [n (%)]	51 (16.7)	25 (15.0)	26 (19.0)	0.44
COPD [n (%)]	43 (14.1)	18 (10.8)	25 (18.2)	0.09
HF [n (%)] [n (%)]	81 (26.6)	34 (20.3)	47 (34.3)	< 0.01
Poly-medication [n (%)]	175 (57.4)	88 (52.7)	87 (63.5)	0.07
Age [mean (SD)]	66.91 (12.79)	62.47 (14.31)	70.52 (10.11)	< 0.0001
Physical component (PCS-12) [mean (SD)]	39.61 (10.35)	41.79 (10.36)	37.82 (10.03)	0.002
Mental component (MCS-12) [mean (SD)]	47.67 (10.11)	47.82 (10.41)	47.55 (9.89)	0.832
Total number of drugs [mean (SD)]	2.43 (1.64)	2.22 (1.51)	2.59 (1.73)	0.052
Six months				
Physical component (PCS-12) [mean (SD)]	40.22 (9.84)	43.05 (9.08)	38.07 (9.91)	< 0.0001
Mental component (MCS-12) [mean (SD)]	49.14 (7.94)	50.55 (7.14)	48.07 (8.36)	0.014
Total number of drugs [mean (SD)]	2.39 (1.90)	1.94 (1.87)	2.93 (1.80)	< 0.0001
Total number of ED visits and readmissions [mean (SD)]	1.42 (3.12)	1.16 (3.48)	1.61 (2.77)	0.262
Twelve months				
Physical component (PCS-12) [mean (SD)]	42.56 (9.75)	45.29 (9.47)	40.19 (9.39)	< 0.0001
Mental component (MCS-12) [mean (SD)]	50.50 (6.21)	51.77 (4.58)	49.40 (7.17)	0.04
Total number of drugs [mean (SD)]	2.60 (2.00)	2.04 (1.95)	3.45 (1.78)	< 0.0001
Total number of ED visits and readmissions [mean (SD)]	0.99 (1.94)	0.77 (1.99)	1.17 (1.89)	0.131

IMTR: Ineffective management of therapeutic regimen (exposed); EMTR: Effective management of therapeutic regimen (unexposed); DM: Diabetes Mellitus (types I and II); Poly-medication: indication for more than 5 drugs; HT: hypertension; COPD: chronic obstructive pulmonary disease; HF: heart failure; SD: standard deviation.

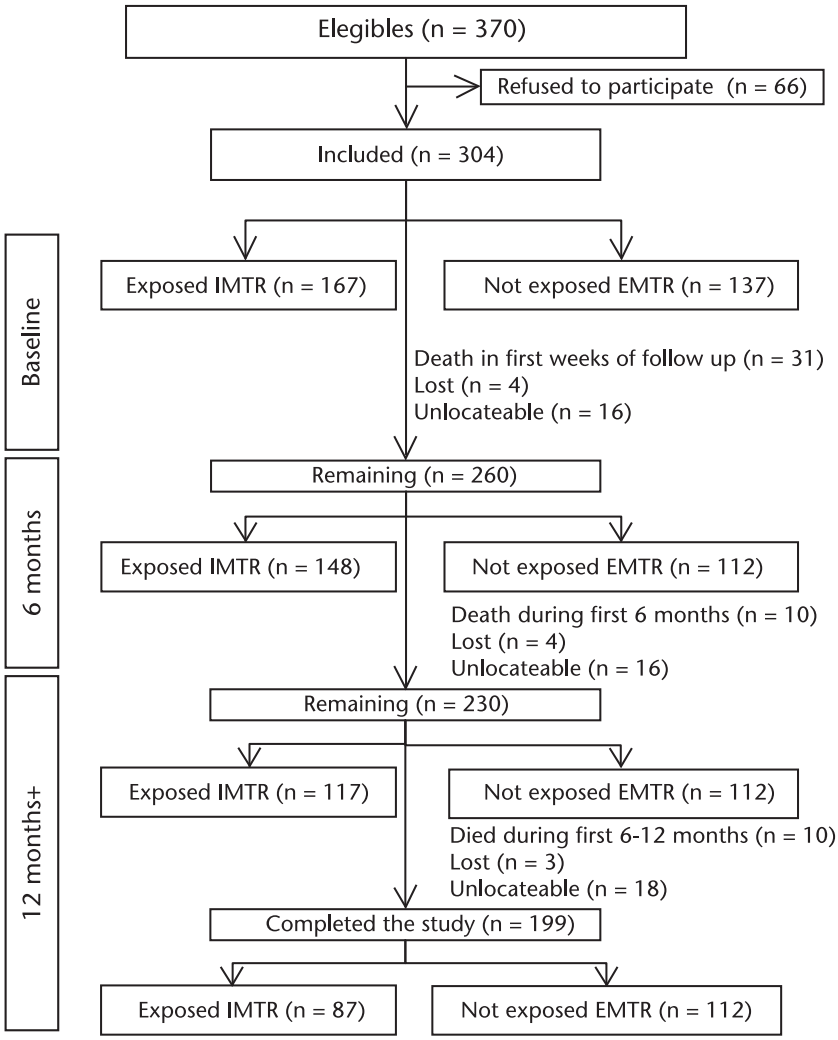

Figure 1. Flowchart of patients throughout the study. IMTR: Ineffective management of therapeutic regimen; EMRT: Effective management of therapeutic regimen.

The risk of readmission was almost four times higher in patients with IMTR, evaluated using Deca-IMTR, than in patients with effective management (adherence). OR was 0.80 (0.48-1.33) at baseline, 2.83 (95% CI 1.77-4.66) at 6 months and of 3.72 (95% CI 2.19-6.32) at 12 months ($p < 0.0001$). Thus, the presence of IMTR was significantly associated with the combined outcome "urgent hospitalization and use of emergency services" (Figure 2).

Differences in the physical component of perceived health, measured by the SF-12, were important in both cohorts: at baseline, 3.97 points (95% CI: 1.45-6.48); at 6 months, 4.97 (95% CI: 2.56-7.98) and at 12 months, 5.09 (95% CI: 2.60-7.58).

A multivariate model was constructed using Cox regression, with any type of readmission as the dependent variable and the presence of IMTR, and poly-medication, as predictors, adjusted for sex. The model, which presented a good fit, showed a significant inverse relationship between IMTR plus poly-medication with readmission, without differences by sex. The model was subsequently adjusted for age, to estimate its potential modulating effect and we found that this association was influenced by this factor (Table 3).

We then used another model including the physical and mental components of quality of life, history of contact with the ED, the presence of IMTR and poly-medication as predictors, adjusted for age and sex. In this model, only a history of contact emerged as a predictor of readmission of any type, and strongly (HR: 20.83; 95% CI: 12.59-34.48), as a result of the interaction of these factors.

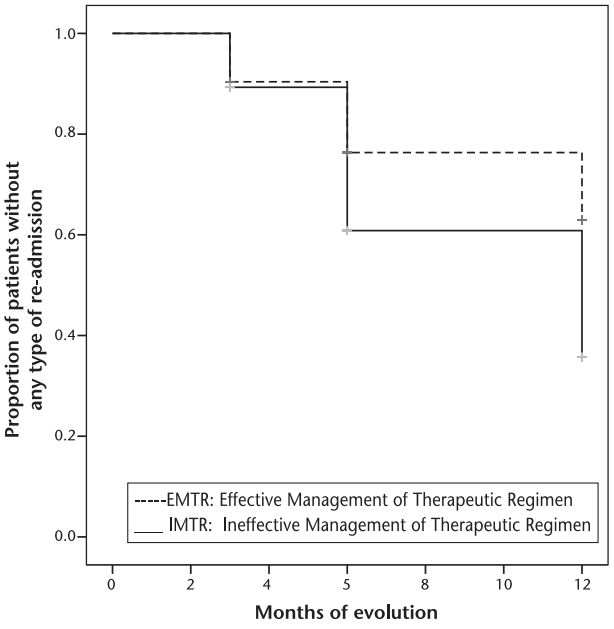

Figure 2. Evolution of readmission according to the therapeutic management.

Discussion

The present study identified known characteristics of the population affected by chronic processes who frequently use the ED. The cohorts comprised mostly elderly, poly-medicated subjects with comorbidity associated with advanced age, and chronic conditions.

The most frequently detected chronic processes were HT and HF, and COPD to a lesser extent. In this regard, it is worth noting that HF and COPD represented nearly 80% of all preventable hospitalizations for chronic conditions in our country (1 admission for COPD for every 555 persons)[17] and revealed segments of patients that require special consideration.

As for the effect of age, the recently published Atlas of variations of the medical practice of hospitalizations in the elderly has shown that 16 out of 100 people aged 75 years and older were admitted with acute exacerbation of chronic conditions, with hospitalization rates 2.5 times higher in areas that occupy the 95th percentile of the distribution[18]. From the point of view of potentially avoidable hospitalizations (PAH), the effect of age is just as clear: 80% of PAH occur in people older than 65 years (76% for angina, 82% for COPD and 88% for HF).

Studies in Spain have shown little relationship between the use of primary care (PC) and visits to the ED, but both have increased in parallel[17,19].

Table 3. Factors associated with readmission, adjusted for sex (above) and for sex and age (below)

						95%CI HR	
	B	SE	Wald	*P*	HR	Lower	Upper
Poly-medication	0.365	0.137	7.086	0.008*	1.44	1.10	1.88
Sex	0.050	0.134	0.141	0.708	1.05	0.80	1.36
IMTR	0.317	0.133	5.689	0.017*	1.37	1.05	1.78
						95%CI HR	
	B	SE	Wald	*P*	HR	Lower	Upper
Poly-medication	0.239	0.139	2.964	0.085	1.270	0.968	1.666
Sex	0.043	0.138	0.096	0.756	1.044	0.797	1.367
IMTR	0.186	0.138	1.814	0.178	1.205	0.919	1.580
Age	0.001	0.005	0.009	0.923	1.001	0.990	1.011

IMTR: effective management of therapeutic regimen; HR: hazard ratio 95%; SE: standard error.

Therefore, there is great uncertainty on the margins for improvement in continuity of care after flare-ups in such patients and the potential impact on future uses of the ED. The key resides in well-known factors: one-quarter of older patients discharged from the ED do not understand their diagnosis, more than 15% are not given recommendations on self-care and more than half do not know what measures to take to avoid a readmission[20]. Possibly, while interventions have been conducted to improve the continuity of care, these have not been evaluated with sufficient rigor, their implementation has been heterogeneous and many unknowns persist about the contents of such interventions[21].

In our study, more than half the patients were poly-medicated, especially with drugs for cardiovascular processes, and there is evidence that educational interventions and treatment management, led by nurses, can help avoid urgent readmissions and hospital admissions due to this[22-24], but such programs are still scarce.

The proportion of readmissions was 7.8%, lower than that reported in similar work conducted in the ED[25]. We detected no difference in gender readmissions, although there is controversy about gender being an independent predictor of urgent readmission, with similar results[26] or contradictory[27] results, although all come from retrospective studies.

The risk of readmission increased progressively with time (months of the study) in patients with IMTR, which again highlights the importance of the therapeutic regime and self-care. The Deca-IMTR instrument showed good reliability for the detection of the risk of urgent readmission and acceptability by professionals about integrating it into usual practice during the study[16]. However, more studies are needed to determine its utility

for systematic screening in the ED. There are several instruments in the literature for this purpose, such as the Identification of Senior at Risk and the Triage Risk Stratification Tool that have shown a low specificity and a high negative predictive value about urgent readmissions in those over 75 years of age[26]. The Rowland questionnaire has shown a better predictive value, with a sensitivity of 88%, a specificity of 72% and a negative predictive value of 98% when used 14 days after discharge from the ED[28].

The possibility of measuring patient levels of knowledge and their therapeutic management using Deca-IMTR would identify the target population for intervention by PC services, while allowing one to monitor the evolution of the patient and generate a point of continuity of care with PC.

However, multivariate analysis showed the powerful interaction of being an ED user and ED readmission, already confirmed in other studies[25] and it is possible that the construction of an index containing both factors may improve predictive validity, to be evaluated in future studies.

In terms of the quality of life and perception of health, the association with poor adhesion was significantly centered on the physical sphere. The decline in the perceived health status and interaction with the environment, as well as the increase in dependence, are constant findings in these population segments, and this implies loss of well-being and quality of life[29,30].

This study has some limitations, such as for example the high age of the cohort, very representative of chronic patients with more ED visits, which has increased the number of patients lost to follow-up. Advanced age also complicated the follow-up procedure, slowing the telephone survey and many of them required multiple sessions, since the participants were often discouraged by the complex approach to dimensions of interest such as the socio-economic profile and the presence and type of family support. It should be noted that during the study period, the ED was subject to in-depth reform, which conditioned patient accessibility. The ED observation area with beds was not affected, so - especially in the initial phase - the recruitment of patients was largely done there. This resulted in the inclusion of a more elderly, dependent population with multiple conditions and therefore with greater therapeutic management problems. These factors especially affected the cohort of patients with IMTR and complicated the follow-up process. This resulted in study losses, apart from mortality, in many cases linked with the need for support, transfer to long-stay institutions and even family problems. Finally, the Deca-IMTR questionnaire was not applied in patients with cognitive impairment and it is unknown how it would perform in this scenario, because of the methodological difficulties involved in exploring such patients' knowledge and adherence. However, the applicability of the proposed tool has been validated in a particularly complex scenario, so its utility in other areas seems promising, despite its limitations.

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Impacto del autocuidado y manejo terapéutico en la utilización de los recursos sanitarios urgentes por pacientes crónicos: estudio de cohortes

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Objetivos: Determinar si el manejo ineficaz del régimen terapéutico (MIRT) en pacientes crónicos que acuden a urgencias es un predictor de mayor utilización de los recursos sanitarios y de peor calidad de vida.
Método: Estudio de cohortes prospectivas. En 2007 se formaron dos cohortes prospectivas en función de su adherencia o no al tratamiento y fueron seguidas durante 12 meses para evaluar la calidad de vida, la adherencia y el uso de recursos sanitarios.
Resultados: De los 302 pacientes incluidos, 167 presentaban MIRT (55,29%). El perfil del paciente era un varón, con hipertensión arterial, polimedicado con baja adherencia terapéutica. El riesgo de reingreso era casi 4 veces mayor en los pacientes expuestos a los 12 meses (OR 3,72, IC al 95%: 2,19-6,32; $p < 0,0001$), evaluados con la herramienta DecaMIRT. Estos pacientes con baja adherencia presentaban una reducción significativa de su calidad de vida superior a 5 puntos (IC 95% 2,60-7,258; $p < 0,05$), si se comparaban con la cohorte no expuesta.
Conclusiones: El manejo efectivo del régimen terapéutico está asociado con la calidad de vida y con el uso que los pacientes crónicos hacen de los recursos sanitarios. El DecaMIRT se ha mostrado como una herramienta válida para medir adherencia terapéutica y puede ayudar a la mejora de la atención de personas con procesos crónicos en los servicios de urgencias hospitalarios (SUH). [Emergencias 2013;25:353-360]

Palabras clave: Adherencia terapéutica. Autocuidado. Servicios de urgencia. Clidad de vida. Enfermedad crónica.