Multimorbidity epidemiology and health care utilization through combined healthcare administrative databases

Epidemiologia della multimorbidità e dell'impatto sui servizi sanitari mediante l'uso combinato delle banche dati sanitarie correnti

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WHAT IS ALREADY KNOWN

- **Management of the rising prevalence of chronic diseases is the main challenge facing governments and healthcare systems worldwide.**
- **The epidemiology of multimorbidity needs to be better investigated and agreement is needed upon methods of analysis to reduce the variability among studies.**
- **Multimorbidity becomes progressively more common with age and it is associated with high mortality, reduced functional status, and increased use of healthcare resources.**

WHAT THIS STUDY ADDS

- **In 2017, the prevalence of multimorbidity in Emilia-Romagna Region (Northern Italy) was 25.2% among people over 18 years old and 61% among people over 65, and the incidence rate was 2.7% and 4.9%, respectively.**
- **About 70% of all healthcare services and 72% of the relative costs incurred by the Regional Health System for their provision were allocated to multimorbid adult patients (≥18 years old); 81% and 86.7%, respectively, among the elderly (≥ 65 years old).**
- **Multimorbidity patterns responsible for the greatest use of healthcare services and expenses for the elderly were identified by factor analysis: 75% of healthcare resources consumption and 78.4% of the related costs were attributable to multimorbidity patterns.**

ABSTRACT

BACKGROUND: multimorbidity analysis provides essential information to support health policy in the field of prevention, clinical management, and resources allocation in order to guarantee personalized and adequate strategies for patients with multiple chronic pathologies.
OBJECTIVES: to present the application of a methodology based upon data retrieved in healthcare administrative databases to investigate the extent of multimorbidity (coexistence of two or more chronic condition), evaluating its epidemiology, its impact on healthcare resources, and identifying patterns of associative multimorbidity, based on non-random association among chronic diseases.
DESIGN: observational study based on regional healthcare data record linkage.
SETTING AND PARTICIPANTS: all people aged 18 years or older permanently or temporarily resident in Emilia-Romagna Region (Northern Italy) during 2017 (amounting to 3,901,252 persons) were included.
MAIN OUTCOME MEASURES: period prevalence and incidence of 32 chronic diseases; identification of patients affected by two or more concurrent chronic diseases (multimorbid patients), and evaluation of their period prevalence, incidence, healthcare resources use, and costs. Factorial analysis was applied to assess association among chronic diseases and to estimate groups of chronic conditions non-randomly coexisting (patterns of multimorbidity) among the elderly (people aged 65+ years).
RESULTS: the multimorbidity incidence rate in 2017 was 2.7% (4.9% in the elderly) and the multimorbidity period prevalence, evaluated on the 3,901,252 adult residents, was 25.2%, ranging from 2.8% in people aged <40 years to 72.5% in octogenarians, with no major difference by gender. Sixty one percent of the elderly suffered from two or more concurrent chronic diseases and, among these, four groups of chronic condition non-randomly coexisting were recognized (cardiovascular, neuropsychiatric, metabolic, and pain pattern). These four multimorbidity patterns affected 39.6% of over 65. The impact on healthcare resources use was considerable: about 70% of all provided healthcare services and 72% of the costs incurred by Regional Health Service was allocated to multimorbid patients (81% and 86.7%, respectively, among the elderly).
CONCLUSIONS: healthcare administrative databases are a valuable tool to assess the frequency of multimorbidity and its impact on healthcare resources. Patients belonging to the four common patterns of multimorbidity identified in this study explained a high proportion of multimorbidity prevalence and healthcare resources use.

Keywords: multimorbidity, prevalence, incidence, factor analysis, healthcare resources consumption

RIASSUNTO

INTRODUZIONE: l'analisi della multimorbidità dà informazioni essenziali a supporto delle politiche sanitarie in materia di prevenzione, gestione clinica e allocazione delle risorse, per poter garantire percorsi di cura personalizzati e adeguati ai pazienti con patologie croniche multiple.
OBIETTIVI: presentare l'applicazione di una metodologia basata su dati disponibili nelle banche dati sanitarie correnti per valutare l'entità della multimorbidità, intesa come copresenza di due o più patologie croniche in un singolo individuo, analizzandone l'epidemiologia, l'impatto sulle risorse sanitarie e identificando *pattern* di multimorbidità ottenuti in base all'associazione non casuale tra patologie croniche.

DISEGNO: studio osservazionale basato sul *record-linkage* di dati sanitari regionali correnti.
SETTING E PARTECIPANTI: la popolazione oggetto di studio è costituita da 3.901.252 persone con età ≥18 anni, residenti permanentemente o temporaneamente in Emilia-Romagna durante il 2017.
PRINCIPALI MISURE DI OUTCOME: prevalenza e incidenza di periodo di 32 patologie croniche; identificazione di pazienti affetti da due o più patologie croniche concomitanti (pazienti con multimorbidità) e valutazione della loro prevalenza, incidenza, dell'utilizzo di risorse sanitarie e dei relativi costi. Mediante l'analisi fattoriale, valutazione dell'associazione tra malattie croniche e stima dei gruppi di condizioni croniche coesistenti in modo non casuale (*pattern* di multimorbidità) nella popolazione anziana (età ≥65 anni).
RISULTATI: nel 2017, l'incidenza di nuovi soggetti con multimorbidità è risultata pari al 2,7% (4,9% tra gli over 65) e la loro prevalenza di periodo, valutata su 3.901.252 residenti adulti, è stata del 25,2%, variando tra il 2,8% rilevato nella popolazione con età inferiore ai 40 anni e il 72,5% rilevato tra gli ultraottantenni, senza differenze rilevanti per genere. Il 61% degli anziani è risultato affetto da due o più malattie croniche concomitanti, tra le quali sono stati individuati quattro gruppi costituiti da condizioni croniche la cui copresenza è risultata statisticamente significativa (*pattern* cardiovascolare, neuropsichiatrico, metabolico e del dolore). I quattro *pattern* di multimorbidità hanno interessato il 39,6% degli over 65. L'impatto sull'uso delle risorse sanitarie è risultato considerevole: circa il 70% delle prestazioni sanitarie erogate (farmaci, ricoveri, prestazioni specialistiche eccetera) fornite nel 2017 dal Servizio sanitario regionale e il 72% dei relativi costi sostenuti sono stati destinati ai pazienti con multimorbidità (tra gli anziani, queste percentuali sono risultate rispettivamente dell'81% e dell'86,7%).
CONCLUSIONI: i database sanitari correnti rappresentano una valida fonte di dati per valutare l'entità della multimorbidità e il suo impatto sull'utilizzo dei servizi sanitari. I quattro *pattern* di multimorbidità stimati nello studio spiegano la maggior parte della prevalenza della multimorbidità e della relativa quota di utilizzo delle risorse sanitarie.

Parole chiave: multimorbidità, prevalenza, incidenza, analisi fattoriale, consumo di risorse sanitarie

INTRODUCTION

Due to life expectancy increase in the last decades, the exponential growth of a new category of patients, above all the elderly patients (people aged 65+ years), characterized by high vulnerability due to the presence of more than one chronic disease, was observed. Addressing the challenges of multimorbidity and providing more effective, affordable, and sustainable care has become a priority at a global, national, and regional level.[1] Nonetheless, research and clinical practice is still mainly focused on single diseases, which may not be appropriate for patients with complex and different overlapping health problems.[2,3]
As recently highlighted by the Academy of Medical Sciences,[4] multimorbidity should be considered a priority research topic across a wide range of perspectives as the available evidence about the burden, determinants, prevention, and treatment of patients with multimorbidity is still inadequate and determining a suboptimal approach to their care.
The epidemiology of multimorbidity needs to be better investigated and agreement is needed upon methods of analysis to reduce the variability among studies due to an inveterate lack of consensus on the definition and to different classifications of pathologies, identification algorithms, study designs, data sources, and statistical methodology used.[5-8]
In addition, tools to evaluate quality and costs of care provided to multimorbid patients should be developed, in order to improve their management.
This study aimed at a better understanding of multimorbidity, using the numerous and valuable existing regional administrative databases, monthly updated. In Italy, all citizens are registered with the national health service. Starting from 1997, Emilia-Romagna Region (ERR) (Northern Italy) – which, as other Italian regions, has responsibility for the organization and administration of publicly financed healthcare – has developed an efficient regional information system to collect data on the health status of the whole population and its use of healthcare services. The regional administrative databases allow to estimate prevalence and incidence of major diseases and to monitor trends in utilization of specific services and procedures.
This study proposes the application of a methodology based upon data retrieved in healthcare administrative databases to investigate the extent of multimorbidity among adult, the impact on regional healthcare resources, and the estimation of groups of chronic conditions non-randomly coexisting (patterns of multimorbidity) among the elderly, in order to orient prevention strategies, management, and resources allocation for patients with multiple chronic diseases.