Optimising medication management for home-dwelling older adults with multiple chronic conditions

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Context

A substantial proportion of older adults suffering from multiple chronic conditions are frequently treated with complex medication regimens [1]. When five or more medications are taken daily, this is commonly known as polypharmacy. Although polypharmacy may be clinically appropriate, polymedicated older adults with multiple chronic conditions are susceptible to medication-related problems, including adverse drug reactions, medication errors and non-adherence, which can result in emergency department visits and hospital admissions/readmissions [2]. Because optimal medication management is one of the conditions necessary for home-dwelling older adults to remain at home and preserve their quality of life, identifying individual profiles presenting a greater risk of medication-related problems and adverse health outcomes is imperative [3]. The underlying mechanisms explaining associations between medication-related problems and polymedicated, home-dwelling, older adults' emergency department visits and hospital admissions/readmissions remains underexplored. To fill this gap, the first phase of the ME@home project aimed to investigate factors leading to MRPs and adverse health outcomes, including 30-day hospital readmissions and unplanned institutionalisation among this population.

Method

We carried out a longitudinal, registry-based study of the hospital record of polymedicated, home-dwelling, older adults using data from 1 January 2015 to 31 December 2018. This four-year, registry-based dataset included polymedicated inpatients (five or more medications prescribed at hospital discharge), aged 65 years old or more, living in their own homes, and hospitalised at least once at the Valais Romand Hospital Centre, composed of five hospitals, in a French-speaking region of Switzerland. The dataset comprised 140 variables routinely collected during hospital stays, including patients' sociodemographic characteristics, medical and surgical diagnoses, and routinely assessed clinical data (such as gait, balance disorders, fall risk, hearing, concentration or ability to learn). Medical and surgical diagnoses were coded based on the International Classification of Diseases version 10 (ICD-10) [4] and Switzerland's surgical intervention classification (CHOP) [5]. Multivariate logistic regressions were computed to explore the risks of adverse health outcomes, such as 30-day readmission and unplanned institutionalization. Ethical approval from the Human Research Ethics Committee of the Canton of Vaud (CER-VD-2018-02196) allowed the hospital's data warehouse to provide the appropriate dataset.

Preliminary results

Dataset customisation

The raw dataset was extracted from the hospital registry into a statistical package for cleaning, customisation, and synthesis [6], and it covered 20,422 electronic records the inpatient stays of of polymedicated, home-dwelling, older adults. Different clustering methods, expert opinion, recoding and missing-value techniques were used to customise and synthesise this multidimensional dataset. Seven clusters of medical diagnoses, surgical interventions, and somatic, cognitive and medication data were extracted using empirical and statistical best practices. Each cluster presented the health statuses of the patients included as accurate-

ly as possible. Medication classifications were computed based on the World Health Organization Anatomical Therapeutic Chemical (ATC) classification system [7]. This overall approach provided a population-based database suitable for analysing descriptive, predictive and survival statistics.

Thirty-day readmission risk

The customised hospital register was used to investigate the 30-day hospital readmission risks related to separate medical diagnoses and prescribed medications. The subset of readmitted inpatients included 13,802 hospital stays, between 2015 and 2018, involving 8,878 different individuals by older adults who returned home and had no missing data. The 30-day hospital readmission rate was 7.8%. Hospital length of stay (Mean ± standard deviation 8.44 ± 7.58; odds ratio [OR] 1.01), multimorbidity (0.58 ±0.92; (OR = 1.42 per additional ICD-10 condition), functional impairments (7.8% vs 7.2%; OR 1.22) and number of prescribed medications (8.95 ± 3.24; OR 1.04 per additional medication prescribed) were significant factors in predicting hospital readmission. The risk was also increased when using certain specific drugs, including antiemetics and antinauseants (OR 3.216 per additional drug unit taken, 95% confidence interval [CI] 1.842–5.617), antihypertensives (OR 1.771, 95% CI 1.287–2.438), drugs for functional gastrointestinal disorders (OR 1.424; 95% CI, 1.166–1.739), systemic hormonal preparations (OR 1.207, 95% CI 1.052–1.385), vitamins (OR 1.201, 95% CI 1.049–1.374) and the concurrent use of beta-blocking agents and drugs for acid-related disorders (OR 1.367, 95% C: 1.046–1.788).

Unplanned institutionalisation

With the available clinical, medical, and drug data, the customised hospital dataset allowed us to investigate 14,705 hospital stays, between 2015 and 2018, by older adults with no missing data who had not died during hospitalisation (N = 14,705). These cases involved 9,430 different individuals, with an average of 1.56 hospital stays per person.admissions from 2015–2018 associated with unplanned institutionalization. The mean prevalence of unplanned institutionalisation (UI) after hospital discharge was 6.1%. Patient-related risk factors leading to institutionalisation were declines in physical function (OR = 3.22; 95% CI 2.67 to 3.87) and cognitive function (OR = 3.75; 95% CI 3.06 to 4.59). In addition, the number of prescribed medications (RH: 8.9.1; UI: 10.9; OR 1.17 per additional drug prescribed; 95% CI 1.15 to 1.19), antiemetics/antinauseants (OR = 24.5357; 95% CI 12.2190 to 57.30), psycholeptics (OR = 1.76; 95% CI 1.60 to 1.93), anti-Parkinson drugs (OR = 1.40; 95% CI 1.12 to 1.75) and antiepileptics (OR = 1.49; 95% CI 1.25 to 1.79) were strongly linked to unplanned institutionalisation.

Perspectives for future research and practice

Our transformed, customised dataset delivered an usable, population-based database suitable for advanced analyses relating to polymedicated, home-dwelling, older adult inpatients. Our results highlighted that patient-, medication- and environment-related risk factors could all lead to 30-day hospital readmission (or institutionalisation). Further research is required, however, across larger samples of older adult inpatients to investigate whether tailored interventions at early stages in chronic diseases could delay physical and cognitive dysfunction and decline, and prevent adverse health outcomes among this growing population segment.

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