



ELSEVIER

Contents lists available at ScienceDirect

Journal of Transport & Health

journal homepage: www.elsevier.com/locate/jth

An exposure–response relationship between multimorbidity and motor-vehicle accidents

Yannick Fortin^{a,b,*}, James A.G. Crispo^{c,d}, Deborah Cohen^{b,e,f}, Simone Dahrouge^{g,h},
Douglas S. McNairⁱ, Donald R. Mattison^{a,j}, Daniel Krewski^{a,b,j}

^a McLaughlin Centre for Population Health Risk Assessment, University of Ottawa, Ottawa, Canada

^b School of Epidemiology, Public Health and Preventive Medicine, University of Ottawa, Ottawa, Canada

^c Department of Neurology, Perelman School of Medicine, University of Pennsylvania, Philadelphia, USA

^d Health Sciences North Research Institute, Sudbury, Canada

^e Canadian Institute for Health Information (CIHI), Ottawa, ON, Canada

^f Institute for Health Policy, Management and Evaluation, University of Toronto, Toronto, Canada

^g C.T. Lamont Primary Health Care Research Center, Bruyère Research Institute, Ottawa, ON, Canada

^h Department of Family Medicine, University of Ottawa, Ottawa, Canada

ⁱ Cerner Corporation, Kansas City, MO, USA

^j Risk Sciences International, Ottawa, Canada

ARTICLE INFO

Article history:

Received 19 October 2016

Received in revised form

9 January 2017

Accepted 16 January 2017

Keywords:

Comorbidity

Multimorbidity

Chronic disease

Crash risk

Motor-vehicle accidents

Automobile driving

ABSTRACT

Objective: Several health conditions are independently associated with an increased risk of experiencing a motor-vehicle accident (MVA). The objective of this study was to investigate the possibility of an exposure–response relationship between multimorbidity and MVAs using electronic health records.

Methods: Driver-related MVA cases recorded between 2002 and 2012 were identified in Cerner Health Facts[®], a national electronic health record database in the United States. Cases were matched to five controls from the same health care facility on age, sex, and index date (± 2 years). Multimorbidity was defined as the total number of morbidities per patient, based on the prevalence of 13 predefined health conditions that were retrospectively assessed during the previous 2 years. The risk of MVA for individuals with increasing multimorbidity, relative to no morbidity, was estimated using conditional logistic regression. Additional analyses were conducted to evaluate possible effect modification by sex and age.

Results: A total of 74,167 unique MVA cases were matched to 370,835 controls: 59.1% of study participants were males and the mean age was 37.0 ± 0.0 years. Multimorbidity, having 2 or more health conditions, was more frequent in cases (8.0%) than in controls (5.6%), $\chi^2(1, N=445,002)=585.9, p < .0001$. A positive association was detected between increasing multimorbidity and MVA risk. Relative to no morbidity, the odds of MVA increased steadily with an increasing number of prevalent morbidities—from 1.11 (95% CI 1.06–1.16) with two concurrent health conditions to 3.53 (95% CI 2.69–4.64) with six or more health conditions. Increasing MVA risk with increasing multimorbidity was more pronounced in women than men.

* Correspondence to: McLaughlin Centre for Population Health Risk Assessment & School of Epidemiology, Public Health and Preventive Medicine, University of Ottawa, Room 119, 850 Peter Morand Crescent, Ottawa, Ontario Canada K1G 3Z7.

E-mail addresses: yfort006@uottawa.ca (Y. Fortin), jcris021@uottawa.ca (J.A.G. Crispo), dcohen@cihi.ca (D. Cohen), sdahrouge@bruyere.org (S. Dahrouge), dmcnair@cerner.com (D.S. McNair), dmattison@risksciences.com (D.R. Mattison), dkrewski@uottawa.ca (D. Krewski).

<http://dx.doi.org/10.1016/j.jth.2017.01.006>

2214-1405/© 2017 Elsevier Ltd All rights reserved.

Conclusions: This study found an overall increased risk of MVA with increasing multimorbidity, which was reproduced across sex and age categories. The important public health implications of these findings warrant replication with additional adjustment for driving habits.

© 2017 Elsevier Ltd All rights reserved.

1. Introduction

In several Western countries, pre-existing morbidity is a determinant of driving eligibility and restrictions (Charlton et al., 2010; Vaa, 2005; Vernon et al., 2002). Such restrictions— including limits on speed, geography, or time of day— are typically imposed on individuals who declare the presence of select health conditions to their licensing authority and are often based on the premise that certain health conditions and their treatment may result in physical or cognitive impairments that increase the risk of having a motor-vehicle accident (MVA) (Johansson et al., 1996; OECD, 2001). Prior studies have identified a number of health conditions as independent predictors of MVAs, including alcohol abuse and dependence, schizophrenia, sleep apnea/narcolepsy, vision impairment, dementia, epilepsy, multiple sclerosis, cardiovascular diseases, diabetes mellitus, psychiatric disorders, and neurological illnesses (Charlton et al., 2010; Dobbs, 2005; Vaa, 2005).

Multimorbidity is typically defined as the co-occurrence of 2 or more chronic health conditions (Boyd and Martin Fortin, 2010). Intuitively, it seems reasonable to expect that persons diagnosed with multiple health conditions independently associated with an increased MVA risk would be at a higher risk of a vehicular crash than those without multimorbidity. In a population-level study based on the assessment of 40 medical and mental health conditions, Barnett et al. (2012) found that 11.3%, 30.4%, and 64.9% of adults aged 25 to 44, 45 to 64, and 65 to 84 years, respectively, were multimorbid. In addition to the high prevalence of multimorbidity in developed countries, there is evidence that multimorbidity has increased for all age groups over the last decades (Koné Pefoyo et al., 2015; Uijen and van de Lisdonk, 2008) and it is expected to continue increasing in the coming years (Anderson, 2012). Older age, female sex, and lower socioeconomic status are associated with greater multimorbidity (Marengoni et al., 2011; Roberts et al., 2015; Uijen and van de Lisdonk, 2008). However, multimorbidity is not limited to the elderly, and affects a proportion of working adults who often drive to maintain employment and participate in social functions. Describing the relationship between increasing multimorbidity and risk of MVAs is therefore an important public health research priority.

A systematic review of epidemiological studies on the relationship between multimorbidity and MVA risk (Dischinger et al., 2000; Koepsell et al., 1994; Marottoli et al., 1994; Oxley et al., 2005; Sims et al., 2000; Vernon et al., 2002) concluded that the risk of MVA is higher with increasing multimorbidity (Marshall and Man-Son-Hing, 2011). Only two of the six studies on crash risk retained by the systematic review were inclusive of drivers of all-ages (Dischinger et al., 2000; Vernon et al., 2002) which limit the representativeness of young and middle age adults. As is often the case, the other studies targeted older adults. More recently, Papa et al. (2014) confirmed the positive association between multimorbidity and MVAs in adults 40 to 70 years but not in those over the age of 70 years. The latter were significantly more likely to lower or abandon their driving activities with increasing multimorbidity while the younger age group did not. Although these findings were based on a cross-sectional study design and self-reports, the authors controlled for driving exposure, categorized morbidity exposure with the validated Cumulative Illness Rating Scale (de Groot et al., 2003; Miller and Towers, 1991), and investigated the possibility of a dose-response effect between multimorbidity and MVA risk. Few studies have investigated changes in MVA risk with each additional health condition. Overall, there is a need for additional research on this topic, particularly whether an exposure-response relationship exists between multimorbidity and MVA in adults across the lifespan.

The primary objective of this case-control study was to examine whether there is an exposure-response relationship between multimorbidity and MVA occurrence. A secondary objective was to investigate if sex and age modify the effect of the relationship between multimorbidity on MVA risk.

2. Methods

2.1. Data source

Electronic health records from the Cerner Health Facts[®] (HF) (Kansas City, MO) database recorded between January 2000 and December 2012 were the basis for this study and accounted for care administered to 36.7 million Americans at health care facilities dispersed across the four U.S. census regions [Northeast, Midwest, South, and West]. HF contains longitudinal health service utilization information on individuals seen in outpatient and acute care settings, including services for the insured and uninsured. Outpatient clinics offering generalist and specialist care include standalone physician offices and clinics integrated within larger health care centers. Available information included demographic characteristics, diagnoses,

Download English Version:

<https://daneshyari.com/en/article/5117868>

Download Persian Version:

<https://daneshyari.com/article/5117868>

[Daneshyari.com](https://daneshyari.com)