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Duration of sickness absence following a bicycle crash, by injury type and injured body region: A nationwide register-based study

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ABSTRACT

In recent years, bicycle injuries have increased but little is known about the relation of such injures to sickness absence (SA). The aim of this study was to investigate duration of SA > 14 days after a bicycle crash, in general and by injury type and injured body region. A population-based study was conducted, including all individuals living in Sweden, aged 16–64 years, who in 2009–2011 had in- or specialized outpatient medical care due to a new injury from a bicycle crash (n = 22,045), excluding those already on SA or full-time disability pension at the time of the crash. Crude and adjusted odds ratios (OR) and 95% confidence intervals (CI) for a new SA were estimated by logistic regression. In total, 4387 (20%) had new SA in connection to the crash. SA was most common among individuals aged 55–64 years (32%), and more common among women (23%) than men (18%). Fractures was the injury type with the highest OR for SA across all durations, but highest for 30–89 days (8.09; CI 6.30–10.39). Spine and back was the body region with the highest OR for SA ≥ 90 days (11.98; CI 7.38–19.46), followed by Traumatic Brain Injuries (6.64; CI 4.01–10.98), and injuries to lower extremities (5.28; CI 3.58–7.78). For 235 individuals (5%) the SA spell lasted ≥ 180 days. Among those cases, the most commonly injured body regions were lower leg (21%) followed by shoulder and upper arm (17%), and Traumatic Brain Injuries (15%). In conclusion, the duration of SA varied with type of injury and injured body region. Among the very long SA spells, common injuries were injuries to the lower leg, to the shoulder and upper arm, and traumatic brain injuries.

1. Introduction

Bicycling has been widely recognized as an important contributor to increase the level of physical activity (Oja et al., 1998; Sahlqvist et al., 2013) and hence to reduce the risk of several diseases related to physical inactivity (Lindström, 2008; Matthews et al., 2007) and all-cause mortality (Kelly et al., 2014). Several studies have emphasized the positive impacts of increased bicycling regarding both health and environment (Hartog et al., 2011; Rojas-Rueda et al., 2013; Holm et al., 2012; Oja et al., 2011). At the same time, bicyclists are vulnerable road-users and have been increasingly recognized to account for a large proportion of traffic-

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related injuries. For example, in Sweden, bicyclists have in recent years become the most frequently injured road-user group, in terms of severe injuries (Swedish Transport Administration, 2015). In Sweden, the definition of serious injuries also includes long-term consequences, and severity of road traffic injuries are described in terms of Permanent Medical Impairment (PMI) (Berg et al., 2016) Medical impairment refers to the reduction in bodily functions and structures, without regard to cause or the injured person's occupation, hobbies, or other circumstances (Malm et al., 2008). In addition to this, it is necessary to describe the functioning and disability related to injuries (World Health Organization, 2001), including Sickness Absence (SA).

To the best of our knowledge, so far only a few studies using SA as outcome measure following a bicycle crash have been published (Björnstig and Näslund, 1984; Hansson, 1976; Olkkonen et al., 1993). These studies are based on data from the 1970´s and 1980´s with relatively small samples and include people of all ages (Björnstig and Näslund, 1984) and in some cases using self-reported SA (Olkkonen et al., 1993). Although the knowledge is limited, previous studies indicate longer SA spells for hospitalized patients injured in a bicycle crash, compared to non-hospitalized patients (Hansson, 1976; Olkkonen et al., 1993). It has also been reported that bicyclists injured in collisions with motor vehicles have longer SA spells than those injured in other types of crashes, and that injuries to the extremities as well as fractures are associated with SA following a bicycle crash (Hansson, 1976; Olkkonen et al., 1993).

However, more knowledge is warranted, based on large, population-based data. Also, knowledge about injuries, especially about those leading to SA of longer durations, is important when considering how to target injury prevention among bicyclists. The aim of this study was to investigate durations of SA after a bicycle crash, in general and by injury type and injured body region.

2. Materials and methods

A population-based study was conducted, including all individuals who in 2009–2011 had specialized in- or outpatient medical care due to an injury from a bicycle crash when aged 16–64 years and living in Sweden 31 December the year before the crash, excluding those who died in connection to the crash (n = 26,885). Data from four nationwide registers were used, linked at individual level using the unique personal identity number assigned to all residents in Sweden: From the *National Board of Health and Welfare,* the in- and specialized outpatient register and the cause of death register were used to identify individuals who had been injured in a bicycle crash, and to obtain information about the injury and the crash. Included were all people who were treated with an injury caused by a bicycle crash in 2009–2011 according to the International Classification of Disease (ICD-10-SE) codes V10-V19 (National Board of Health and Welfare, 2011). For each such case, the following information was obtained: indate or visit date, outdate, and injury diagnoses. The individuals who at any time during the three years prior to the date of the bicycle crash had received health care after a bicycle- or other traffic-related crash were excluded (n = 1613).

From *Statistics Sweden*'s register the Longitudinal integration database for health insurance and labour market studies (LISA) sociodemographic information was obtained regarding 31 December the year before the crash for all individuals (sex, age, educational level, country of birth, job situation, marriage status, type of living area). From the *Social Insurance Agency's database,* Micro-data for analyses of social insurance (MiDAS), information about all dates and diagnoses of SA and disability pension (DP) in 2008–2013 was obtained. The duration of SA was calculated using net days, (e. g two days on halftime SA correspond to one net day).

To identify SA spells that were due to a bicycle injury, all SA spells that started four days before or up to four days after the date for receiving the first care due to the injury were included. Only SA spells that lasted for more than 14 days were included. Those who already were on SA or full-time DP at the time of the crash were excluded from the analyses of SA (n = 2592). Also, individuals without injury diagnoses from ICD-10-SE chapters S00-T89 or code Z041 (includes examination and observation after a transport-related crash) were excluded (n = 635), leaving 22,045 individuals for analyses. The SA spell was followed until it ended, or if not, at the longest through December 2013.

An individual could have more than one visit/hospitalization on the same day. Each visit is coded with a main diagnosis and any contributing secondary diagnoses. In total, 77% of the individuals had only one visit/hospitalization and hence one main injury diagnoses. Among the remaining 23% with more than one visit/hospitalization and main injury diagnoses, the diagnoses from inpatient care was selected over outpatient care, and any injury diagnoses was selected before other types of diagnoses, in order to only include one main injury.

Type of injury and injured body region were set in relation to the individual's SA following the bicycle crash, sociodemographic variables including sex, age, level of education (low, medium, high), country of birth (Sweden or rest of the world), type of living area (big cities, medium-sized cities, small cities/villages), and marital status (married or not married), and duration of hospital stay (outpatient care only, inpatient care ≤ 1 day, inpatient care ≥ 2 days). The selection of cut off at ≥ 2 days were based on the median days of in-patient care.

2.1. Statistical analysis

Descriptive statistics were used to outline study-population characteristics and prevalence of SA. Duration of SA was based on net-days, different durations were categorized in four different groups; “15–29 days”, “30–89 days”, “90–179 days”, and “ $\geq$ 180 days”. Odds ratios (OR) with 95% confidence interval (CI) for various categories of different durations of SA were calculated by logistic regression analyses using SPSS (Version 23). For the regression analyses, three groups of durations of SA was used; “15–29 days”, “30–89 days”, “ $\geq$ 90 days”. Significant covariates from the univariable model were included in the multivariable analyses, these variables were: sex, age, level of education, country of birth and duration of hospital stay, as these variables in an initial analysis were shown to be associated with the duration of SA. Both crude and adjusted OR:s were computed. Internal injuries were used as the