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Health-related quality of life after upper extremity injuries and predictors for suboptimal outcome

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ABSTRACT

Purpose: The purpose of this study was to examine the impact of upper extremity injuries (UEIs) on health-related quality of life (HRQoL) in adult patients compared with victims of other types of injuries and with the general population, in order to establish recovery patterns of different types of UEIs and determine predictors for suboptimal outcome in the long term.
Methods: Data were obtained from the Dutch Injury Surveillance System, from the National Hospital Discharge Registry, and from a patient follow-up survey. A total of 608 patients (aged ≥18 years) with an UEI were included. The main outcome measure was HRQoL measured at 2.5, 5, 9 and 24 months after UEI according to the EuroQol-5D (EQ-5D). The predictors for the suboptimal outcome were examined by multivariate linear regression analyses.
Results: For non-hospitalized UEI patients, a substantial loss in HRQoL was observed after 2.5 months which improved to the level of the general population norms by 24 months. For hospitalized UEI patients, HRQoL improved from 2.5 to 24 months but remained far below population norms. The more proximal UEI had a lower HRQoL and a slower recovery of HRQoL than distal injuries. At all time points, the proportion of UEI patients with limitations on the health domains self-care, usual activities and complaints of pain and/or discomfort was higher than in the group of all injuries. Female gender, higher age, low educational level, co-morbidity, shoulder or upper arm injury, multiple injuries and hospitalization are independent predictors for long-term loss in HRQoL.
Conclusions: The impact of UEI exceeds the health consequences of the group with all injuries, for both non-hospitalized and hospitalized patients. The presence of UEI substantially reduces HRQoL in the short and long term, mainly due to limitations on the health domains self-care, usual activities and complaints of pain and/or discomfort.
Clinical relevance: The impact of UEIs on HRQoL exceeds the health consequences of the group with all injuries. Proximal UEIs had a lower HRQoL and slower recovery than distal injuries. The predictors for the outcome on specific UEIs need to be further investigated in clinical studies, to understand how these differences affect patient-reported outcome measures. These data provide additional insight into treatment outcome and are needed to improve quality of care.

Introduction

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Upper extremity injuries (UEIs) are frequent in the adult population and lead to substantial use of health services and large production losses [1–3]. As a consequence, UEIs represent an economic burden on society. UEIs in general, and hand and wrist injuries in particular, are one of the most costly injury types, before lower extremity injuries and skull and brain injuries [4].

However, the societal impact of injuries extends beyond the economic costs and includes other sequelae, such as functional limitations, pain, psychological distress and decreased social interaction [5–7]. This spectrum of negative consequences is included in generic health-related quality of life (HRQoL) measures, such as patient-reported outcomes reflecting the impact of ill health on several dimensions of human life. Generic HRQoL measures enable straightforward comparisons of injury consequences with general population values and the impact of other diseases, and also allow outcome comparisons between several types of injury affecting different body regions, such as the upper or lower extremity or the head [8–10].

HRQoL measures are increasingly applied in injured populations and have improved our insight into recovery patterns and non-fatal health outcomes within this field [11]. For example, it has been shown that even injuries of low severity (i.e., without threat to life) may lead to sustained suffering and that far more healthy life-years are lost by non-fatal injuries than by mortality [12,13]. These insights were obtained with the Euro-Qol-5D questionnaire (EQ-5D), a generic HRQoL measure recommended for broad application in the injury field by several international consensus groups [8,9]. This measure is well fitted for application in comprehensive patient populations covering a broad range of injuries [14] and has also been validated and applied in specific groups of injury patients, such as burns [15,16], lower extremity injuries [17] and specific upper extremity fracture groups [18–27].

To date, comprehensive population-based studies using this generic outcome measure to examine HRQoL after UEI are lacking. Therefore, the aim of the present study was: (1) to examine the impact of UEIs on HRQoL in adult patients at 2.5, 5, 9 and 24 months after injury compared with victims of other types of injuries and with the general population; (2) to compare recovery patterns of different types of UEI; and (3) to determine predictors for the suboptimal outcome in the long term.

Methods

Study population

A prospective follow-up study was conducted among patients with UEIs aged ≥18 years. Data were retrieved from the Dutch Injury Surveillance System and from the National Hospital Discharge Registry [28–30]. In The Netherlands, all injuries treated at the emergency department (ED) are recorded in the injury surveillance system. During the study period, 17 hospitals (14 general hospitals and three university hospitals) participated in this injury surveillance system. These hospitals were selected based on their geographical location to draw from both urban and rural areas. These hospitals together form a sample of 12% of the patients attending EDs in The Netherlands (16.5 million inhabitants in 2009). The patients visiting these selected hospitals in the injury surveillance system are representative for the Dutch population in age and gender structure, and estimations to the national level can be made [28,31]. In the National Hospital Discharge Registry, individual information on hospitalized patient care is collected on a nationwide basis with almost 100% coverage.

We included all patients with UEIs (S42 (0.0–0.4), S42 (0.7–0.9), S43 (0.0–0.7), S45 (0.0–0.9) to S49 (0.0–0.9), S52 (0.0–0.9), S53 (0.0–0.4), S55 (0.0–0.9) to S59 (0.0–0.9), S62 (0.0–0.8), S63 (0.0–0.7), S65 (0.0–0.9) to S69 (0.0–0.9), T04.2, T05 (0.0–0.2), T10X, and T11 (0.2–0.9) according to the International Classification of Diseases of the World Health Organization (ICD 10th revision).

Patients with injuries were included based on the recorded primary diagnosis, as used in the Eurocost classification of diagnostic groups [28,29]. In the case of multiple injuries, the most severe injury was recorded in the injury surveillance system, according to a hierarchical rule. This hierarchical rule gives priority to spinal cord and brain injury, lower extremity injury above UEI and to fractures above other injuries [1,4,29,32].

Health-related quality of life

A stratified random sample of adult patients (aged ≥18 years) with UEIs recorded in the injury surveillance system ($n = 1341$) received a postal survey on their HRQoL at 2.5, 5, 9 and 24 months after UEI [32]. To increase the number of completed surveys, non-respondents received a reminder. The EQ-5D was used to assess HRQoL on five health dimensions (mobility, self-care, usual activities, pain or discomfort and anxiety or depression) and a previously developed scoring algorithm was used to express these five health dimensions into a summary score [33]. This summary score, the EQ-5D utility score, ranges from −0.59 (worst possible health state) to 1 (best health state). The EQ-5D utility score of patients at 2.5, 5, 9 and 24 months after UEI was compared with reference values of the general population (aged ≥18 years) [34].

The potential determinants of reduced HRQoL were derived from literature [32]. These determinants were classified into sociodemographic (age, gender and educational level), injury (type of injury and multiple injuries), health-care-related (hospitalized vs. non-hospitalized) and co-morbidity (defined as the previous presence of disease at the time of injury) determinants. The study was approved by the local institutional review board.

Statistical analysis

A non-response analysis was performed using multivariate logistic regression. Age, gender, educational level, injury type, hospitalization status and health status (EQ-5D summary score) were tested as possible determinants of non-response. Because response rates varied between the 2.5, 5, 9 and 24-month patient surveys, separate non-response analyses were performed for each survey. We used the significant variables ($p < 0.05$) to adjust for response bias by weighing the respondents with the inverse probability of response. The weighted data are representative for a population of injury patients attending an ED in The Netherlands. About 10% of the patients did not respond to one or more health dimensions of the EQ-5D. Because the summary score can only be obtained in the case of complete information on all five health dimensions, the hot deck imputation technique was applied to estimate the missing values. In this method, a missing value is replaced by the value reported by a person with similar scores in the health domain [32]. Sociodemographic and injury-related determinants were identified as predictors of the functional outcome in univariate and step-forward multivariate regression analyses. In a multivariate regression analysis, we tested gender, age, education, co-morbidity, shoulder or upper arm injuries, multiple injuries and hospitalization as potential predictors for long-term loss in HRQoL.

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