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Interrater reliability of the injury reporting of the injury surveillance system used in international athletics championships

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ABSTRACT

Objectives: The quality of epidemiological injury data depends on the reliability of reporting to an injury surveillance system. Ascertaining whether all physicians/physiotherapists report the same information for the same injury case is of major interest to determine data validity. The aim of this study was therefore to analyse the data collection reliability through the analysis of the interrater reliability.
Design: Cross-sectional survey.
Methods: During the 2016 European Athletics Advanced Athletics Medicine Course in Amsterdam, all national medical teams were asked to complete seven virtual case reports on a standardised injury report form using the same definitions and classifications of injuries as the international athletics championships injury surveillance protocol. The completeness of data and the Fleiss' kappa coefficients for the inter-rater reliability were calculated for: sex, age, event, circumstance, location, type, assumed cause and estimated time-loss.
Results: Forty-one team physicians and physiotherapists of national medical teams participated in the study (response rate 89.1%). Data completeness was 96.9%. The Fleiss' kappa coefficients were: *almost perfect* for sex (k = 1), injury location (k = 0.991), event (k = 0.953), circumstance (k = 0.942), and age (k = 0.870), *moderate* for type (k = 0.507), *fair* for assumed cause (k = 0.394), and *poor* for estimated time-loss (k = 0.155).
Conclusions: The injury surveillance system used during international athletics championships provided reliable data for "sex", "location", "event", "circumstance", and "age". More caution should be taken for "assumed cause" and "type", and even more for "estimated time-loss". This injury surveillance system displays satisfactory data quality (reliable data and high data completeness), and thus, can be recommended as tool to collect epidemiology information on injuries during international athletics championships.

1. Introduction

Injury surveillance studies during international athletics championships are a significant part of the effort of the European Athletics (EAA)[1–4] and the International Association of Athletics Federations (IAAF)[5–9] to prevent athletes' injuries.[10,11] However, the quality of epidemiological data depends on the quality of the injury surveillance system implemented.[12–14] Edouard et al.[15] analysed the quality of the injury surveillance system used during international athletics championships,[6,7,16,17] and reported that it was useful, simple, feasible, flexible, acceptable, and with security and confidentiality, according to the Centre for Disease Control and

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Table 1
Completeness of data: number (and percentage compared to the maximal number expected) of data for each variable and case report.

	Sex	Age	Event	Circumstance	Location	Type	Cause	Time-loss	Total
Case report 1	40 (97.6)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	39 (95.1)	38 (92.7)	322 (98.2)
Case report 2	40 (97.6)	35 (85.4)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	40 (97.6)	37 (90.2)	316 (96.3)
Case report 3	40 (97.6)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	37 (90.2)	323 (98.5)
Case report 4	40 (97.6)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	38 (92.7)	38 (92.7)	321 (97.9)
Case report 5	39 (95.1)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	37 (90.2)	322 (98.2)
Case report 6	38 (92.7)	35 (85.4)	41 (100.0)	41 (100.0)	41 (100.0)	41 (100.0)	36 (87.8)	37 (90.2)	310 (94.5)
Case report 7	38 (92.7)	34 (82.9)	41 (100.0)	41 (100.0)	41 (100.0)	39 (95.1)	39 (95.1)	37 (90.2)	310 (94.5)
Total	275 (95.8)	268 (93.4)	287 (100.0)	287 (100.0)	287 (100.0)	285 (99.3)	274 (95.5)	261 (90.9)	2224 (96.9)

Prevention (CDC) guidelines.[12,13] In addition, it had good methodological qualities, with high national medical team participation, coverage of athletes, response rates and completeness of injury data.[15]

However, other methodological aspects,[12,13] such as objectivity, sensitivity, reliability and validity, have not been analysed yet. These methodological aspects concern the injury reporting, which is an important part of the injury surveillance system. The validity of the data refers to their accuracy and reliability, and is a component of the data quality in addition to the data completeness and objectivity.[12] Accuracy and reliability can be analysed through the analysis of the interrater variability. Indeed, determining whether all physicians/physiotherapists (corresponding to the rater population of interest) report the same information for the same case of injury sustained by an athlete (corresponding to the subject population of interest) allows evaluating the reliability of the data,[18,19] and is of course of major interest to determine the quality of the injury surveillance system and the collected data, and consequently to better interpret epidemiological injury data representing the first step of the injury prevention sequence.[11]

The aim of this study was therefore to analyse the reliability of the data collection (injury reporting) through the analysis of the interrater reliability.

2. Methods

During the first Advanced Athletics Medicine Course of the European Athletics (3–4 July 2016, in Amsterdam), which took place just before the 23th European Athletics Championships in Amsterdam, all national medical teams (n = 46) were asked to participate in the study, and to complete seven virtual case reports on a standardised injury report form using the same definitions and classifications of injuries as the international athletics championships injury surveillance protocol.[6,7,16,17]

The seven virtual case reports were created by two sports medicine physicians specialized in athletics (PE and PB) based on the most common and relevant injury situation from previous studies during international championships,[1–9,20] and to provide an overview of the injury situation possibilities: (1) sprinter, sudden hamstring muscle injury, (2) jumper, sudden ankle sprain, (3) thrower, chronic shoulder tendinopathy, (4) long distance runner, lower leg muscle injury, (5) jumper, chronic Achilles tendinopathy, (6) sprinter, sudden hamstring muscle injury, and (7) decathlete, sudden ankle sprain (Appendix A in Supplementary material). After oral explanation of the aim and modalities of the study, a booklet in paper form was distributed to all participants of the medical seminar. The booklet included the aim and modalities of the study, the seven case reports, the definitions and classifications of injuries, and the standardised report form to report the data (Appendix A in Supplementary material). For each case report, the participants should complete the standardised report form information. All information (oral and booklet) was provided in English, but participants were allowed to use translation tools or the injury classification (in French, German, Russian and Spanish) used in previous studies during international championships.[1–9,20] No communication between raters was allowed. The completed report forms were collected during the same day after allowing sufficient time for participants to complete them. All participants were members of athletics national medical teams with experience in sports medicine with high-level athletes, especially during international championships, and with experience in the injury surveillance studies during international athletics championships. No ethical approval was required since the study did not involve patients.

The variables used for the analyses were the same as previous studies during international athletics championships[1–9,15,20]: sex (female or male), age, event, circumstance (training or competition), location, type and assumed cause of injury as well as estimated time-loss. The codes and classification of the variables followed the consensus statement for epidemiological studies in Athletics (track and field).[17] Assumed cause of injury were analysed in two ways: (i) using a dichotomous classification into two categories: traumatic vs. overuse, and (ii) using the classification of causes from the consensus statement.[17] Analysis of estimated time-loss were performed in two ways: (i) using a dichotomous classification into two categories: no time loss vs. time-loss injury, and (ii) using the classification of time-loss from the consensus statement.[17] The analysis of non-participation and missing data were first performed through the calculation of the rate of participation and the completeness of data, respectively, as reported by Edouard et al.[15] Our present study followed the guidelines for reporting reliability and agreement studies.[18] The level of measurement of the variables were categorised as nominal/categorical.[18,19] The Fleiss' kappa coefficient was calculated to determine the interrater reliability for each case report and each variable.[18,19] According to Landis and Koch,[21] the kappa values were interpreted as: ≤0 = poor, 0.01–0.20 = slight, 0.21–0.40 = fair, 0.41–0.60 = moderate, 0.61–0.80 = substantial, and 0.81–1 = almost perfect. The overall percentage agreement was used to evaluate the interrater agreement for each variable. All data were processed using Excel or R (http://www.R-project.org).

3. Results

Out of the 46 team physicians and physiotherapists of national medical teams participating in the 2016 European Athletics Advanced Athletics Medicine Course, 41 (89.1%) accepted to participate in this study and returned the standardised report form with information completed for the seven case reports. There were 21 (51.2%) physicians and 18 (43.9%) physiotherapists; information was missing for 2 (4.9%).

The completeness of data was 96.9% (2224 data of 2296), ranging from 80.3 to 100% according to the participants, 90.9 to 100% according to the variables, and 94.5 to 98.2% according to the case reports (Table 1). The 72 missing data were for estimated time-loss (n = 26; 36.1%), age (n = 19; 26.4%), sex (n = 12; 16.7%), assumed cause (n = 13; 18.1%) and type (n = 2; 2.8%); no missing information occurred for event, circumstances and location.

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