

# Validation of an instrument for data collection in rugby union

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## Introduction

Australia has over one million sporting injuries annually costing almost one billion dollars<sup>1</sup>. While injury rates are relatively high in the rugby codes in comparison to other sports<sup>2</sup>, there is limited research in Rugby Union that provides accurate reproducible data<sup>3</sup>. Most of these studies used only hospital databases or had differing definitions of injury, therefore, the true nature and extent of injury is unknown<sup>4</sup>. The need to standardise injury definitions within Rugby Union and other sports has been widely recommended<sup>5</sup>. The importance of collecting injury data from both games and training is also emphasised as all injuries have the potential to impact upon sporting performance<sup>4</sup>.

## Statement of the Problem

Development of a standardised data collection instrument to assess incidence rates, is critical to methodologically sound, injury research<sup>6</sup>. An extensive literature review failed to locate a validated instrument for injury data collection in Rugby Union. Valid and reliable injury data collection instruments increase the accuracy of study results and may assist in the identification of risk factors associated with sport<sup>5,7</sup>. The extent to which an instrument measures what it is intended to measure is termed validity<sup>8</sup>. In contrast, reliability is the extent to which a measurement instrument reproduces the same results on two or more occasions<sup>9</sup>. While many studies recommended the use of valid and reliable measurement instruments in Rugby Union<sup>5</sup>, very few studies have discussed the validation of the data collection instruments used<sup>2,5</sup>. The aim of this study is to provide the basis from which Rugby Union injury data can be collected using a rigorously validated injury report form.

## Methodology

An extensive review of published literature and existing data collection instruments was conducted. Based on this research, a seven-stage process was used to develop and validate the Rugby Union Injury Report Form- For Games and Training (See Table 1)

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Table 1. Stages used to develop and validate the Rugby Union Injury Report Form

Stage One	design of a Rugby Union Injury Report Form
Stage Two	testing the Form for face validity
Stage Three	testing the Form for content validity
Stage Four	testing the criterion validity of the Form
Stage Five	development of a gold standard for the Form
Stage Six	assessment of inter- and intra-rater reliability of the Form
Stage Seven	assessment of inter-rater reliability of the Form 'in situ'

To assist in the assessment of reliability a gold standard was developed (See Table 1 Stage 5). There were no recommendations in the literature regarding the procedure required to establish a gold standard for data collection instruments in sport, however, there was ample evidence of their development in clinical medicine<sup>10</sup>. Table 2 details the steps taken to develop a gold standard for data collection instruments.

Table 2. Methodological steps used to develop a gold standard for data collection instruments

Step One	review of literature
Step Two	development of a desirable criteria for inclusion
Step Three	development of a standardised data collection form including standardised descriptions
Step Four	development of an information/instruction sheet
Step Five	validation of the gold standard by an expert panel
Step Six	trial of the gold standard by trained raters on a predetermined set of injuries
Step Seven	trial of the gold standard 'in situ'

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## Results

The design and content of the Rugby Union Injury Report Form – For Games and Training was devised from recommendations elicited from the literature reviewed and a review of existing data collection instruments. Face, content and criterion validity were successfully assessed. A seven-step protocol to develop a gold standard was also developed to assist in the validation process. Intra-rater reliability results indicated a 98% agreement between raters. Inter-rater reliability results indicated a 98% agreement by raters against the gold standard. The forty trialists completing Forms—'in situ' during four games were found to have an inter-rater reliability agreement of 98% for nine injuries.

The design of the front of the Rugby Union Injury Report Form – For Games and Training, comprises closed-ended questions and instructions indicate the need to merely circle an option for each question. The reverse of the Form allows space for a written record of assessment, treatment and management of injury. A separate Form is completed for each injury and copies of all medical reports are attached to provide a complete record of the assessment, treatment and management of each injury. The reverse side of the Form incorporates the Orchard Sports Injury Classification System (1997) to streamline data input. The OSICS is currently used by the Australian Institute of Sports and the Australian Rules Football Commission, and is endorsed by the Australian Sports Medicine Federation<sup>11</sup>. A key to coding the Form was also developed to assist data input and analysis using a statistical computer program. The key was subjected to review by gold standard panel members and representatives from various sporting bodies.

## Discussion

A comprehensive review of published literature failed to find a valid measurement instrument for collection of injury data in Rugby Union, therefore, this study aimed to produce a validated measurement instrument. The major findings from the literature review indicated three criteria that relate directly to instrument development as: definition of injury, validity and reliability.

Four injury definitions devised for this study were: minor – if able to return to game or training in which injury occurred; mild – if missed one week; moderate – if missed two weeks; and severe— if missed more than two weeks. Based on the findings from the literature review, the Form was designed to collect injury data from both games and training, in a standardised manner, ensuring all injuries were recorded.

The Form was subjected to a rigorous validation process producing a data collection instrument with high face, content and criterion validity.

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Representatives from groups who may be potential users of the validated Form were systematically recruited onto a panel assessing face validity, in an endeavour to make the Form acceptable and relevant to end users<sup>7</sup>. This study assessed inter-rater and intra-rater reliability of the Rugby Union Injury Report Form – For Games and Training using ten raters, over a five-week period, to view the videotape of five injuries devised in the gold standard procedure. A 98% agreement level for inter-rater and intra-rater reliability was achieved. According to Altman's scale<sup>12</sup>, the Form may be considered to have a high level of both inter-rater and intra-rater reliability.

The use of trained raters in the field was found to be the most accurate data collection method<sup>13</sup>. A trial of the Form was conducted 'in situ' to further assess inter-rater reliability. Results of this study indicated a high level of inter-rater reliability when using raters in the field. Raters were chosen randomly from the spectators present at each game and asked to remain in one position during the game under review, thus blinding them to other raters results as Hennekens and Buring<sup>13</sup> stated this was 'the single most important way to minimise bias. This method was used extensively in clinical medicine studies to increase the rigour of the validation process<sup>14</sup>.

Many researchers agree validated data collection instruments are fundamental to injury prevention<sup>1,5</sup>. The establishment of a gold standard increased the rigour of the validation process, as did the use of multiple raters, both expert and novice in the field of injury prevention and/or Rugby Union. The major outcome of this research is a rigorous procedure for the development and validation of a measurement instrument for data collection in Rugby Union with an inter-rater and intra-rater reliability agreement of 98%. This validated Form can now be confidently used in prospective studies for injury data collection in Rugby Union, from elite to social levels including injuries sustained at both games and training.

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**STATEMENT OF THE PROBLEM:** Development of a standardised data collection instrument to assess incidence rates, is critical to methodologically sound, injury research<sup>6</sup>. An extensive literature review failed to locate a validated instrument for injury data collection in Rugby Union. Valid and reliable injury data collection instruments increase the accuracy of study results and may assist in the identification of risk factors associated with sport<sup>5,7</sup>. The extent to which an instrument measures what it is intended to measure is termed validity<sup>8</sup>. In contrast, reliability is the extent to which a measurement instrument reproduces the same results on two or more occasions<sup>9</sup>. While many studies recommended the use of valid and reliable measurement instruments in Rugby Union<sup>5</sup>, very few studies have discussed the validation of the data collection instruments used<sup>2,5</sup>. The aim of this study is to provide the basis from which Rugby Union injury data can be collected using a rigorously validated injury report form.

**METHODOLOGY:** An extensive review of published literature and existing data collection instruments was conducted. Based on this research, a seven-stage process was used to develop and validate the Rugby Union Injury Report Form- For Games and Training (See Table 1)

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The Form was subjected to a rigorous validation process producing a data collection instrument with high face, content and criterion validity. Representatives from groups who may be potential users of the validated Form were systematically recruited onto a panel assessing face validity, in an endeavour to make the Form acceptable and relevant to end users<sup>7</sup>. This study assessed inter-rater and intra-rater reliability of the Rugby Union Injury Report Form – For Games and Training using ten raters, over a five-week period, to view the videotape of five injuries devised in the gold standard procedure. A 98% agreement level for inter-rater and intra-rater reliability was achieved. According to Altman's scale<sup>12</sup>, the Form may be considered to have a high level of both inter-rater and intra-rater reliability.

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