

AREYOUFINE? international course on personal injury assessment based on biomechanical analysis for the improvement of sustainability and effectiveness in health systems

José María Baydal Bertomeu¹; Raquel Portilla Parrilla¹; Juan López Pascual¹; Ignacio Bermejo Bosch¹; José Ignacio Muñoz-Barús²; Denise Amram³; Santo Davide Ferrara; Enrico Pizzorno⁴; Danuta Roman-Liu⁵; Guido Viel⁶

¹Instituto de Biomecánica (IBV). Universitat Politècnica de València. Building 9C. Camino de Vera s/n (46022) Valencia. Spain

² USC-UNIVERSIDADE DE SANTIAGO DE COMPOSTELA

³ SSSUP-SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO SANT'ANNA

⁴ CEREDOC

⁵ CIOP-CENTRALNY INSTYTUT OCHRONY PRACY - PANSTWOWY INSTYTUT BADAWCZY

⁶ IALM – INTERNATIONAL ACADEMY OF LEGAL MEDICINE

The *AREYOUFINE? project* has promoted the development of an online course on new biomechanical analysis methodologies for the improvement of the clinical evaluation of the major musculoskeletal disorders prevalent in Europe, and its adaptation to the different professional and medical-legal realities that exist in various EU countries. The professionals who have taken part in the *AREYOUFINE? course* emphasize its usefulness and suitability.

INTRODUCTION

Bodily injury is defined as the result of an aggression, whether exogenous or endogenous, in any area of the body whose origin may be due to a violent or natural event. The first group corresponds to accidents, and the second has to do with pathological processes that can lead to all manner of illnesses.

Bodily injury manifests itself in different ways, but one of the most important disorders which appear most frequently in health surveys in Europe, are muscle-skeletal disorders. Muscle-skeletal injuries are very common in industrialized countries and have very important consequences for the individual and for society.

Traffic accidents are another external agent that play a relevant role in the prevalence of musculoskeletal disorders. **Whiplash associated disorders (WAD) is the term given to the most common injury in motor vehicle collisions.** According to statistics for Spain, WAD is present in more than 80% of road traffic accidents.

Many of these injuries have a nonspecific origin or it is not possible to find an organic disorder that justifies them. Very often, conventional diagnostic techniques do not show up any apparent lesions at the organic level. This situation means that clinicians must work in conditions that lack precision. **The absence of objective complementary tools that might help to determine bodily injury gives rise, in certain cases, to incorrect assessments and inappropriate treatment, which have a negative impact on patients and on both public and private health systems.**

Recently, with the aim of overcoming the barriers to and the limitations of clinical evaluation processes, biomechanical analysis has come into play (Figure 1), making it possible to increase the degree of objective information in the evaluation of injuries and after affects produced in workplace and traffic accidents.



Figure 1. WAAS/IBV (Whiplash Advanced Analysis System) developed by the IBV.

However, **despite the opportunities that the new biomechanical methodologies open up for the improvement of the clinical assessment of musculoskeletal disorders, it is clear that there is a lack of knowledge among professionals as to how they can be applied.** In addition, there is the added difficulty of the existence of different legal and regulatory frameworks in each country of the EU.

In this context, **and focusing on the new biomechanical analysis methodologies, the main objective of the project is to develop, validate and transfer an online course designed to improve the clinical evaluation of the major musculoskeletal disorders prevalent in Europe and to adapt this knowledge to the various professional realities and legal requirements in EU countries.**

For this purpose, a consortium has been set up, composed of six institutions from three European countries: Spain, Italy and Poland, which ensure interdisciplinary skills.

- **Biomechanics:**

- The Institute of Biomechanics (**IBV**), a center of reference in biomechanical research and its application in medicine, which has coordinated the project.
- The Central Institute for Labor Protection (**CIOP-GDP**), a reference institution in developing methods for health management systems.

- **Legal Medicine:** The University of Santiago de Compostela (**USC**), experts in Forensic Sciences.

- **Judicial Aspects:** Santa Anna University of Pisa (**SSSUP**), which specializes in Legal Sciences.
- **Representation of the final agents:**
 - The European Confederation of Specialists in the Assessment and Compensation of Physical Injury (**CEREDOC**).
 - An international association that represents the national associations of medical examiners at the European level; and the International Academy of Legal Medicine (**IALM**).

DEVELOPMENT OF THE PROJECT

The implementation of the project has been divided into 5 main tasks:

- 1. Harmonization and standardization of the content of the course.** This task has focused on defining the medical-legal process involved in evaluating bodily injury in different EU countries. The knowledge of the expert partners in legal and forensic medicine has made it possible to review the common and specific aspects of the legal framework for assessing bodily injury in the benchmark European countries.
- 2. Identification of needs at European level.** The definition of the content of the *AREYOUFINE?* course has been based on the needs of potential users of that same content. These needs have been identified by a study, based on the Delphi method, carried out on 458 specialists in the field of functional assessment: forensic doctors, medical experts and medical consultants working in insurance companies, lawyers, etc.
- 3. Development, integration and adaptation of the course content.** The course has been designed to cover all the aspects of interest that were identified in the early stages of the project. The content of the *AREYOUFINE?* course has been prepared in four languages: Spanish, English, Italian and Polish. The course has been implemented in the online (*e-learning*) platform that belongs to the IBV training campus.
- 4. Evaluation of the course content.** To ensure the quality of the content of the *AREYOUFINE?* course, a dual phase of validation has been developed. The first validation has been carried out by a group of experts in functional assessment who are external to the project; this group has validated the content in the four languages described. Subsequently, validation has been carried out by implementing a pilot course with end users from different professional sectors.
- 5. Analysis of the results of the evaluation of the course content and implementation of the final version.** The improvements that arose from the validation phase have been used to improve the course content, prior to the implementation of the final version.

RESULTS OF THE PROJECT

During the development of the project, different research actions have been carried out. Here are some of the most relevant:

Harmonization and standardization of the course content

This work has made it possible to identify the main institutions involved in the process of bodily injury evaluation; the recognition of the main actors and the professionals involved in bodily injury and medical evaluation; the identification of the main laws and medical scales used to classify the loss of functional capacity and a list of the most prevalent injuries and illnesses.

Identification of needs at European level

As has been said, the content and characteristics of the course that is to be implemented have been chosen thanks to the participation of a **group of experts**, the project partners and **458 professionals**. The main results are as follows:

- The creation of an online course is considered desirable.
- The duration must be less than 50 hours.
- The course content should focus on practical cases.
- The most important content for the course should be:
 - An introduction to the biomechanical evaluation of functional capacity.
 - The most interesting pathologies that can most benefit from biomechanical assessment are those related to the cervical vertebral column, the lumbar vertebral column and the shoulder.

International evaluation of the quality of the AREYOUFINE? course.

Two types of validations of the course that was implemented were carried out. One was by a group of experts in bodily injury assessment, external to the project and the other by students who have completed the Pilot Course. To form the group of experts, each institution involved in the project contacted a reference specialist in their own country (Spain, Italy, Poland and France).

153 students participated in the Pilot Course, of whom 60 successfully passed the relevant tests and examinations, obtaining the final certificate (Figure 2). The professional profile of the students who participated in the pilot course was composed, for the most part, by lawyers, doctors (rehabilitators, forensic doctors and traumatologists) and physiotherapists.

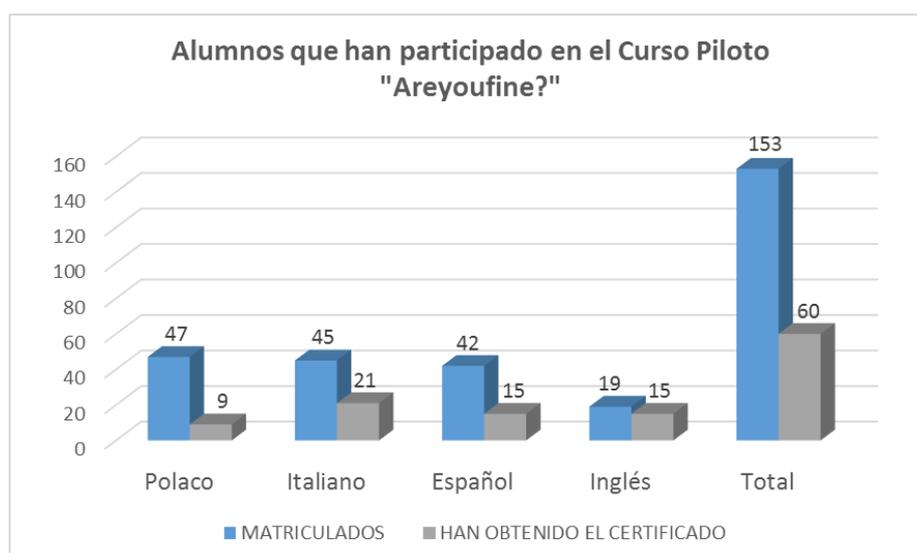


Figure 2. Students enrolled and those who have obtained the certificate of the AREYOUFINE? Pilot Course.

CHARACTERISTICS OF THE *AREYOUFINE?* COURSE

Structure of the *AREYOUFINE?* course

The course has been organized into 4 modules, each containing different training sessions. The following is the main structure of the course:

Module 1: Assessment of personal injury

- Session 1: General medical-legal issues in personal injury
- Session 2: Compensation for personal injury

Module 2: Introduction to bodily injury

- Session 1: Introduction to biomechanical evaluation
- Session 2: Introduction to the concept of simulation
- Session 3: Relevance and application of biomechanical assessment

Module 3: Clinical Cases

- Case 1: Lumbar spine
- Case 2: Shoulder
- Case 3: Cervical spine, hand and assessment of balance

Module 4: Supplementary material

- Photogrammetry
- Inclinomerty
- Goniometry
- Inertial systems
- Force platform
- Pressure platform
- Instrumented templates
- Dynamometry
- NedLumbar/IBV
- NedSVE/IBV
- NedHombro/IBV
- NedMano/IBV
- NedCervical/IBV

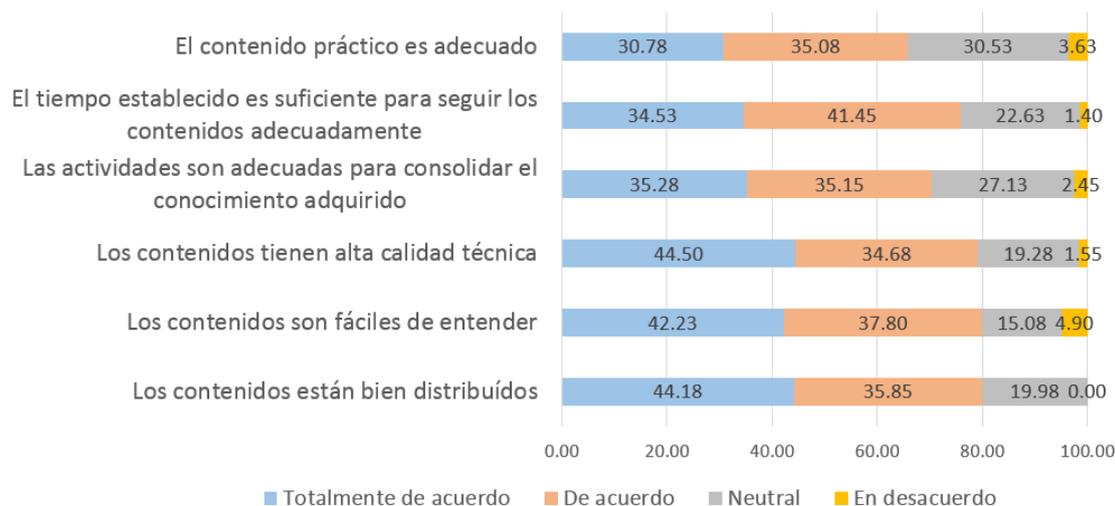
Assessment of the quality of the *AREYOUFINE?* course by the professionals

The participation of experts and professionals from the sector has been fundamental for the development and evaluation of the *AREYOUFINE?* course. For that reason, IALM and CEREDOC have worked intensively on the project to raise awareness of *AREYOUFINE?* and to get the professionals to participate proactively.

Both the expert group and the 153 students who participated in the pilot course assessed the quality of the online platform and the quality of the content.

The evaluation of the content concluded that it was of good technical quality, well distributed, and easy to understand. In addition, their assessment of the proposed activities and the practical content was also positive; they were deemed suitable for consolidating the knowledge acquired.

Figure 3 shows some of the most relevant results of the assessment of the content of the *AREYOUFINE?* course. Here we can see how between 65-80% of the students agree or strongly agree as to the quality of the course.



1. The practical content is suitable
2. The time set is sufficient for suitably following the content
3. The activities are suitable for consolidating the acquired knowledge
4. The content is of high technical quality
5. The content is easy to understand
6. The content is well distributed

Totally agree – Agree- Neutral - Disagree

Figure 3. Main results of the validation of the content of the AREYOUFINE? Pilot Course

On the other hand, the evaluation of the online platform stressed that its graphics look good and make for easier navigation and access to information.

Finally, it was considered that the time frame for taking the course was suitable as far as following the course content is concerned.

CONCLUSIONS

The AREYOUFINE? project has made it possible to identify the training needs of European legal medicine professionals and to develop an innovative online (e-learning) course aimed at the application of biomechanical analysis to the context of the assessment of bodily injury.

The results of the validations carried out by the group of experts and students of the pilot course allow us to conclude that **the AREYOUFINE? course stands out for its adequacy, usefulness and clarity of exposition.**

The AREYOUFINE? course is available in four languages: English, Spanish, Italian and Polish.

ACKNOWLEDGEMENTS

This work is part of the activities promoted by the AREYOUFINE? project. (Training in assessment of bodily injury based on biomechanical analysis to improve the

sustainability and effectiveness of the health system), funded by the European Commission within the Erasmus + Program under grant agreement No. 2015 -1 - ES01 - KA202 - 016294.

For more information on the course, please contact us:

www.areyoufine.eu

campus.ibv@ibv.upv.es



Cofinanciado por el
programa Erasmus+
de la Unión Europea

Members of the Consortium:

