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OSTEOSYNTHESIS FOR SURGICAL MANAGEMENT OF FRACTURES - AN E-LEARNING APPROACH TO EDUCATION AND TRAINING IN BIOMECHANICS

Abstract:

Aim and object of the study: This project is aimed at adapting and integrating innovative training courses and results from previous Leonardo da Vinci project into continuing VET of medicine professionals (residents, surgeons) and professionals involved in implants development and manufacturing Methods: Each participating country has its own regulations, training practices and certification rules and this objective addresses the specific needs in the target country for the transfer of innovation. At the same time, the European collaboration will help to share experiences and best practices in osteosynthesis and can help the EU to harmonize the training of professionals and to progress towards some qualification standards. An E-learning course is presented and discussed in details, after being approved by an analysis of experience and needs or orthopaedic surgeons and residents in three participating countries. Results: An E-learning course for residents and orthopaedic surgeons in learning new techniques for osteosyntesis, management of fractures using implants, postoperative complications, requirements for implants design is presented. Definition of learning outcomes for surgeons' courses is performeed. Conclusion: The added value of this project will be in the improved quality and attractiveness of the continuing VET in the target countries by transferring existing innovations to new geographic environments and across the sectors of medicine and engineering. This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the nformation contained therein. Project Number 2013-1-BG1-LEO05-08711

Keywords:

E-learning; Biomechanics; Education; Fractures; Osteosynthesis; Training

JEL Classification: I00

1 Introduction

The Orthobiomed project is aimed at adapting and integrating innovative training courses and results from a previous Leonardo da Vinci project into continuing vocational education and training of medicine professionals (residents, surgeons) and professionals involved in implants development and manufacturing

2 Background

The present need analysis was done within the Lifelong Learning Program (LLP) – Leonardo da Vinci project, entitled “Osteosynthesis for Surgical Management of Fractures for Orthopedic Surgeons and Biomedical Engineers”. Osteosynthesis is defined as surgical fixation of fractures after reduction with closed or open methods and is performed by every practising orthopaedic surgeon on a daily basis. The OrhoBioMed project lies within the scope of the LLP initiative goals as set by the European Community in an effort to support education and training, and enhance the development of skills across Europe. In specific, the aims of the project are:

- To identify and analyse the needs of biomedical labour market, of biomedical engineers, orthopaedic surgeons, managers, residents in the sector.
- To select and analyse the e-learning innovative content to meet these needs and upgrade the content with the new developments in the sector.
- To adapt, upgrade and implement the Osteoform e-learning materials to the legal framework, training system, and language in Bulgaria and Greece and to the needs of the target groups in all partner countries.

The aims of the project will be accomplished by developing and carrying out a combination of activities, starting by identifying the specific needs of the users in the health care sector. This is a very important and necessary first step of the whole project towards the realization of the next steps, with emphasis on proper material selection and adaptation of new courses in a technically innovative performance support environment that can meet the real training needs of the medical staff.

3 Specific Purposes

The need analysis within the project activities intends to identify and analyze precise user requirements and real training needs of staff in the medical/paramedical sector on the field of fracture fixation (osteosynthesis). The goal of the analysis was first to confirm and clarify the existence of specific needs on innovative e-learning materials, special topics of interest, and problem-based learning skills in osteosynthesis. Next, the results of this task were “translated” and analyzed in a way so as to support the decision-making procedure for providing the best training framework and most appropriate modules to be adopted in the support environment. Consequently, the results will allow the development, adaptation and upgrade of any traditional and out-of-date material, tool, practice and platform to a more targeted, technically sophisticated and integrated e-learning process.

4 Limitations

Beyond inherent limitations of each tool used in the need analysis, professional, local medico-legal and social differences may have been underestimated. Although the sample was quite representative all the people that have been selected to take part in the survey were orthopaedic surgeons of different training and skills background and residents in orthopaedic surgery, but the specific contents of the survey could easily justify the targeted audience.

5 Methods, Samples and Instrumentation

The ***methods*** and ***instrumentation*** used in this analysis were primarily surveys and interviews aiming at incorporating the opinions of different groups of professionals in the medical sector, after a careful review of the literature in the field of fracture fixation. The main approach used was interviews, during which a specific form of a 34-item, web-based questionnaire (same with the one given by the rest of the partners in the project) was used from the Bulgarian Orthopaedic Surgeons. The questionnaire focused on the knowledge already acquired in the fields of bone biology and biomechanics, fractures, and osteosynthesis and on the necessity of training in the respective fields. In particular, the respondents were medical doctors and residents, with the majority being orthopaedic surgeons. Surveys and interviews were conducted at the Department of Orthopaedics and Traumatology of Medical University – Plovdiv, Bulgaria and took place in January and February, 2014 in Plovdiv, Bulgaria.

The ***sample*** was quite representative (22 people in total filled the questionnaire) and differed as far as of the specific major/discipline/area of work and interests, as well as seniority, age and gender. However, all the people but one that have been selected to take part in the survey were certified orthopaedic surgeons and residents in orthopaedic surgery . Those people were also selected after a careful analysis of the specific groups of potential targets that will benefit the most from the existence of the vocational learning environment that is to be developed. Interviews with the following groups of surgeons were conducted:

- Certified orthopaedic surgeons : 12 of 22 participants, the vast majority of them having more than 15 years of experience in orthopaedic surgery
- Residents in orthopaedics and traumatology: 8 of 22 participants
- Others: 1 of 22 participants
- Not completed survey: 1 of 22 participants.

6 Results

The results of the specific need analysis carried out in Medical University – Plovdiv, Bulgaria provided the following observations:

- The majority of Bulgarian orthopaedic surgeons and residents find their ***training*** appropriate or really appropriate and have received training in their specific field in the last 2 years
- The majority of Bulgarian orthopaedic surgeons and residents considered the ***online training modality*** as appropriate or really appropriate and declared that less than 50 hours of training would be necessary.

- The majority of Bulgarian orthopaedic surgeons and residents considered their ***level of knowledge*** in the specific fields (bone biomechanics, vascularization, fracture classification, fracture fixation, reparation systems, complications etc) as intermediate, and would like to increase their information in the respective fields.
- Almost all Bulgarian orthopaedic surgeons and residents considered that the specific fields (bone biomechanics, vascularization, fracture classification, fracture fixation, reparation systems, complications etc) would be interesting regarding ***hand fractures and implants to fix hand fractures***.
- The majority of Bulgarian orthopaedic surgeons and residents considered that the specific fields (bone biomechanics, vascularization, fracture classification, fracture fixation, reparation systems, complications etc) would be interesting regarding ***backbone fractures and implants to fix backbone fractures***.
- Four Bulgarian orthopaedic surgeons/residents noted that the specific fields (bone biomechanics, vascularization, fracture classification, fracture fixation, reparation systems, complications etc) would be interesting regarding ***long bone fractures***, two considered all kinds of fractures, one considered pelvic fractures, and one considered lower extremity fractures.
- The ***expectations*** of the Bulgarian orthopaedic surgeons and residents were to increase their knowledge and their professional skills and share experience with other professionals. The practical & interesting contents, the easiness & usability in the course access, need of few time to carry the course out, and the useful contents for the job were considered important ***requirements*** to take a course from most Bulgarian orthopaedic surgeons/residents. The ***amount of time*** necessary to complete successfully the course is 40 - 80 hours and the ***amount of money*** that Bulgarian surgeons would be willing to pay was less than 300 euros, even less than 100 euros.

7 Conclusions

The novelty of the osteosynthesis for Orthopaedic surgeons component of the OrthoBioMed project lies with its procedure-specificity. It will be usefull to apply the fixation methods in specific anatomic regions, including the hand. Osteosynthesis (fracture fixation) is one of the two major components of the surgical treatment of fractures that includes closed or open reduction and fixation. By addressing the training requirements of the orthopaedic surgeons both the surgeons and the patients will benefit from the increase of knowledge and professional skills of orthopaedic surgeons.

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