

**EUSEM WORKING GROUP ON QUALITY AND SAFETY IN EMERGENCY
MEDICINE (EWQSEM).**

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On behalf the EWQSEM Group.

May 19, 2022.

Outlines

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Introduction

Quality and Safety is the cornerstone of the healthcare system. The continuous quality improvement follows for decades the principle proposed by Deming (Figure 1). Emergency Medicine (EM) is implemented as a primary specialty in many countries in Europe and all over the world. Efforts have been focused on setting design, the organization of pre-hospital EM systems and emergency departments (ED) and improve better triage, quality of care, and outcomes of life-threatening conditions.

Most following information come from Bellou et al. research group publication (5). Beside specific scientific studies (5, 7-13, 15-19) there is only limited literature on Quality and Safety (Q&S) in EM. Robust data and registries on Q&S are still missing in the context of pre-hospital care, ED, and observation unit management. Q&S is a specific area which is of interest for emergency physicians and in-patient specialists such as intensivists, internists, cardiologists, anesthesiologists, and geriatricians, non-doctor healthcare providers, administrators etc. New concepts emphasize that Q&S involves the entire health care system starting from ED to the hospital ward and the administration leadership. The classical pyramid where the administration stays at the peak is gone. The involvement of all healthcare providers is the cornerstone of continuous quality improvement (CQI).

Despite the Institute of Medicine's 2000 call to action with the publication of "To Err Is Human" and subsequent patient safety campaigns, the burden of medical errors remains significant (1-4). It has been estimated that up to 98,000 annual fatalities can be attributed to medical errors, with more than one million related injuries occurring every year in the US (1). Aside from the direct harm to the patient, medical errors are a considerable financial burden to the healthcare system. In 1999, it was estimated that the total costs of preventable medical errors in the US lies between \$17 billion and \$29 billion annually (1). To classify these events, the World Health Organization, among others, utilizes the term patient safety event (PSE), which has been defined as any unintended or unexpected incident that could have or did lead to the harm of a patient (5, 6).

EDs are the first place where patients receive medical attention for acute illness or injury and are a high-risk environment for patient safety incidents. Reasons include high patient volume, patient acuity and complexity, a work environment characterized by time constraints, multiple interruptions, and disturbed sleep cycles for health care workers, as well as factors such as high-risk diagnostic and therapeutic interventions and variable levels of physician training (5, 6). A

study by the Harvard Medical Practice found that the ED is the third most common site of adverse events (AE) in hospitals and 70% of these events were due to negligence (4). However, historical data suggest that the ED accounts for only about 3% of all hospital safety incidents (7). Another large prospective study reported that severe medical errors (with the potential to provoke harm) occurred in 10% of visits in US EDs (8). In 2013, a systematic review of the AE rate in the ED found that 36% to 71% of them were preventable (9). Using pre-specified screening criteria, Klasco et al. reported an overall incidence of error of 0.13% among all ED patients with an AE rate of 0.11% (10). In a retrospective study, we found that among 383,586 ED visits, 6519 (1.7%) quality assurance issues were reported with a PSEs incidence rate of 6.1%. Among the 397 PSEs, 258 were AEs including 82 patient safety events, and 139 near miss events. During the 7-year period of the study, we observed a fourfold increase in near miss events despite a decrease in the rate of AEs, the incidence of patient adverse events remained relatively constant (5).

For more than a decade, the rate of harm caused by medical errors has remained constant (10). Forster et al. and Chern et al. found higher AE rates harm (4.1%) which occurred in higher risk conditions, higher acuity areas, and in higher triage categories (11, 12). AEs were also more common in older patients (11). The most common types of AE occurring in hospital inpatients were related to surgery and medication, whilst in the ED setting, AE are related to diagnostic issues and suboptimal management planning (11, 12, 13, 14). Hendrie et al. found that AEs and incidents are common in the ED with rates of 6.0 % and 4.1% respectively, and 77% of them were judged preventable (15). Little is known about the impact of the implementation of a patient safety tracking system (PSTS) on PSEs. In a Boston academic hospital centre, it was shown that implementation of an organisation including Q&S ED committee, a tracking and safety events reporting system with interaction with all hospital departments and administration improved the quality of care (5). Consequently, understanding factors associated with PSEs (error, AE, near miss) in the ED remains unclear and requires further clarification (5). Leadership and communication are critical for CQI (16). Finally, there is no doubt that the time spent in the ED is correlated to quality and safety in the ED (17, 18, 19).

The ED crisis has increased Q&S issues. Indeed, this global crisis impacts both the number of staff (doctors, nurses, and other clinicians) working in the ED, but also the number of downstream beds, generating a permanent overcrowding in ED which increases the workload and induces challenges for ED teams as well as increasing the risk of occurrence of morbidity and mortality. These difficulties lead to a decrease in the quality of care, particularly by

increasing the risk of medication errors, and results in a probably avoidable mortality of about 13 deaths per ED per year (15, 16)

The mission of this new EuSEM working group is to develop Q&S with the collaboration with the International Society of Quality in Healthcare (ISQUA). One of the novelties of this group is the creation of a unique group including emergency physicians and other specialist healthcare providers and leadership management, leaders and members of EWQSEM who will dedicate their efforts on the development of Q&S in EM in Europe and help developing countries at the global level. This group will focus on five domains: Education and Training, Guidelines and Organization, Leadership in Q&S, Global Q&S, and Research/Technology innovation/Big Data. EWQSEM will collaborate closely with the EUSEM Professional Committee. The EWQSEM will collaborate in the development of the International Centre for Excellence in Q&S in EM Healthcare (ICEQS).

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Goals (Appendix 1, 2, 3)

Five subgroups and Chapters will interact to achieve the EWQSEM goals: Education and Training in Q&S, Guidelines and Organization in Q&S, Leadership in Q&S, Research and Technology Innovation in Q&S, Global Health and Q&S.

The goals of EWQSEM are:

- To propose a Curriculum on Q&S in EM that will be included in the European EM Curriculum.
- To develop guidance on educational programs to improve Q&S in EM. The group will implement a European Course on Quality and Safety in EM (ECQSEM) that will be submitted to UEMS for accreditation and certification. This course will also be disseminated at the global level in collaboration with the International Course on Quality and Safety in EM (ICQSEM).
- To collaborate with the International Fellowship in Q&S in EM (IFQSEM).
- To write guidelines and disseminate existing guidelines relevant to Q&S in pre-hospital care, emergency departments, observations units, and clinical decisions units. Recommendations will be gathered in a EUSEM White Book and submitted for publication. First, we will gather all documents available in Europe from the national EM societies. The group will collaborate with the EUSEM Professional Committee in the development of European Quality Indicators in EM. This chapter will also include recommendations related to human resources and leadership for continuous quality and safety improvement in EM. All these guidelines will be included in the EUSEM White Book for Quality and Safety in EM.
- EWQSEM will provide guidance for the implementation of new Q&S processes in emergency departments through collaborative audits.
- To write a comprehensive collaborative textbook focused on Q&S in EM. The chair of the EWQSEM is working to confirm a publisher.
- To develop collaboration with other scientific societies and international research groups active in influencing Q&S in healthcare at the global level. This includes international organizations such as the International Society in Quality in Healthcare (ISQUA), the International Federation of Emergency Medicine Interest Group on Q&S, the Global Network on Emergency Medicine, and the Global Health Research Collaborative.
- To propose quality improvement and clinical research studies in the pre-hospital and ED settings including observation units and clinical decision units. The EWQSEM will develop Q&S databases in collaboration with EUSEM and international research networks. These databases will help to develop multicenter studies and establish international comparisons for improving Q&S in Europe and at the global level.

- To be involved in the development of new technologies such as artificial intelligence for improving Q&S in EM and implementing adverse events reporting systems. Collaboration will be established with international research groups.
- To collaborate with the International Group for Quality & Safety in Emergency Medicine that developed an international fellowship in Q&S with the project to create an international Master of Science Program on Quality & Safety in EM.
- To evolve toward a EUSEM Section and to become the voice of EUSEM on Q&S in EM in Europe.

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- Administration professionals: TBC

The EWQSEM is composed by five subgroups and Chapters (Figure 2).

1. Education and Training

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Khaldoon Alkhaldi UAE

Giovanni Ricevuti Italy

Jean Jacques Banihachemi, France

Laure Abensur Vuillaume, France

Mohamed Mouhaoui, Morocco

Churchill Onyeji, USA/Nigeria

Pórdís Katrín Þorsteinsdóttir, Island: European Society of Nurses (EuSN)

Jochen Bergs, Belgium (EuSN)

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2. Guidelines and Organization

Enrique Casalino: **Chair TBC**

Abdelouahab Bellou, China/USA/France

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Karim Tazarourte, France

Steve Photiou, Italy

Abdo Khoury, France

Shamai Grossman, USA

Grossmann Florian, Switzerland (EuSN)

3. Leadership

Ian Higginson: **Chair**

Abdelouahab Bellou

John Heyworth

Marion Douplat

Frederic Thys

Steve Photiou

Grossmann Florian, Switzerland (EuSN)

Christien Van Der Linden, Netherland (EuSN)

4. Research

Said Hachimi Idrissi, Belgium: **Chair**

Abdelouahab Bellou, China/USA/France

John Heyworth, UK

Anna Khalemsky, Israel

David Schwartz, Israel

James Paxton, USA

Carlos Camargo, USA

Zoubir Boudi, UAE

Gabriel Savioli, Italy

Xin Li, China

Laure Abensur Vuillaume, France

Dyonissios Tsilimingrass, USA

Þórdís Katrín Þorsteinsdóttir, Island (EuSN)

Jochen Bergs, Belgium (EuSN)

Lisa Kurland, Sweden

5. Global Health

Giles Cattermole, UK: **Chair**

Vijaya Arun Kumar, USA

Nagi Souaiby, Lebanon

Abdelouahab Bellou, China/USA/France

John Heyworth, USA

Khaldoon AlKhaldi, UAE

Churchill Onyeji, USA/Nigeria

Camilo Gutierrez, USA

Virtual meetings via zoom will be organized for the whole EWQSEM every three months. Subgroups have the freedom to organize their specific meetings. All members will be informed about all meetings and free to attend. Chair, Vice-Chair, and secretary will have specific meetings to follow all EWQSEM activities to guide subgroups. Face to face meetings will be organized during EUSEM congresses. Alternate meetings will be proposed between ISQUA and EWQSEM.

Minute of meetings will be written with copy to the EUSEM CEO, Davi Kaur, and available on the EuSEM website.

Road Map

The EWQSEM proposes a three-year road map with the following objectives. Each subgroup will define its agenda following the roadmap and achieve the agreed goals.

1. Webpage

A webpage will be created on the EUSEM website; work will be done in collaboration with the EuSEM website committee. Eric Revue and Zoubir Boudi will be in charge to create the webpage. The page should be attractive and easy to access and will contain the Logo of EUSEM, status of the Working Group, five domains: Education and Training, Guidelines and Organization, Research/Technology/Innovation, Leadership, Global Quality and Safety.

2. Education and Training

The principal goal of EWQSEM is to implement educational programmes on Q&S for doctors and non-doctor professionals involved in EM. Educational events will be planned during the year:

- To propose a curriculum on Q&S that will be included in the European EM Curriculum.
- To be involved in the International Fellowship in Q&S in EM and the International Master of Sciences in Q&S in EM.
- To write a collaborative textbook on Q&S in Emergency Medicine. The chair of the EWQSEM will propose an outline of the book and is in negotiation with publishers regarding publication of the book.
- To organize sessions (State of the Art and Clinical questions) on Q&S during the EUSEM congresses.
- To be involved in joint sessions during the ISQUA congresses.
- Specific 2-day event focused on Q&S in EM organized during the year. This event will be named EWQSEM/ISQUA Summit.

- To be involved in the three days of scientific sessions of the Global Network in Emergency Medicine (GNEM) held during the yearly International Critical Care and Emergency Medicine Conference in Dubai.

3. Guidelines

The EM European community are awaiting Q&S guidelines on the website. The aims of the group are:

- To review existing guidelines specifically related to Q&S in pre-hospital care and EDs. These guidelines should be available on the webpage of the EWQSEM. We should ask the European Emergency Medicine National Societies regarding their projects in improving Q&S. The EUSEM White Book on Q&S in EM will be written involving national societies.
- To list new guidelines that should be proposed and prioritization of one new guideline every two or three years. A task force should be defined including experts in EM and quality and safety to write and update guidelines. The group will write the EUSEM White Book for Quality and Safety in EM.
- To propose collaborative Audits, focused on Q&S to help EDs implementing Q&S.

4. Research/Technology Innovation/Databases (Figure 2)

The working group will implement a vision and a strategy for developing Research in Q&S in EM. The first study will be a survey in Europe describing Q&S in EM settings. This study will be done through European National Societies (EuSEM). The second project is an international multicenter study on the association between EDLOS and negative outcomes supported by the EUSEM Research Committee. This project could be the first step of a specific EU FP7. Many areas of research could be explored on care organization and quality care, impact on morbidity-mortality of models' management (role of network, ambulatory care...), specific EM fields (acute coronary syndrome, stroke, sepsis, trauma...). A non-exhaustive list of current projects is presented at the end of the document. Projects will be discussed with EUSEM Research committee when needed to see how we can build Q&S collaborative registries. The collaboration with ISQUA will also strengthen EWQSEM research projects.

5. Leadership

The subgroup will have the task to develop the concept of leadership in Q&S allowing continuous quality improvement. Members will be involved in writing the chapter of Leadership in the textbook on Q&S and the WQSEM White book.

6. Global Health and Q&S

The goal of this subgroup is to establish a global health program focused on the development of Q&S in EM in developing countries. The subgroup will collaborate with other EWQSEM subgroups to implement all domains related to Q&S. The collaboration with ISQUA will

strengthen the activities of the subgroup. The subgroup will be involved in the joint conference between Emirati Critical Care Society and Global Network in Emergency Medicine.

Figure 1: The Deming wheel for a continuous improvement of quality and safety of the care.



Figure 2: Organisation of the EUSEM Working Group on Quality & Safety in Emergency Medicine.

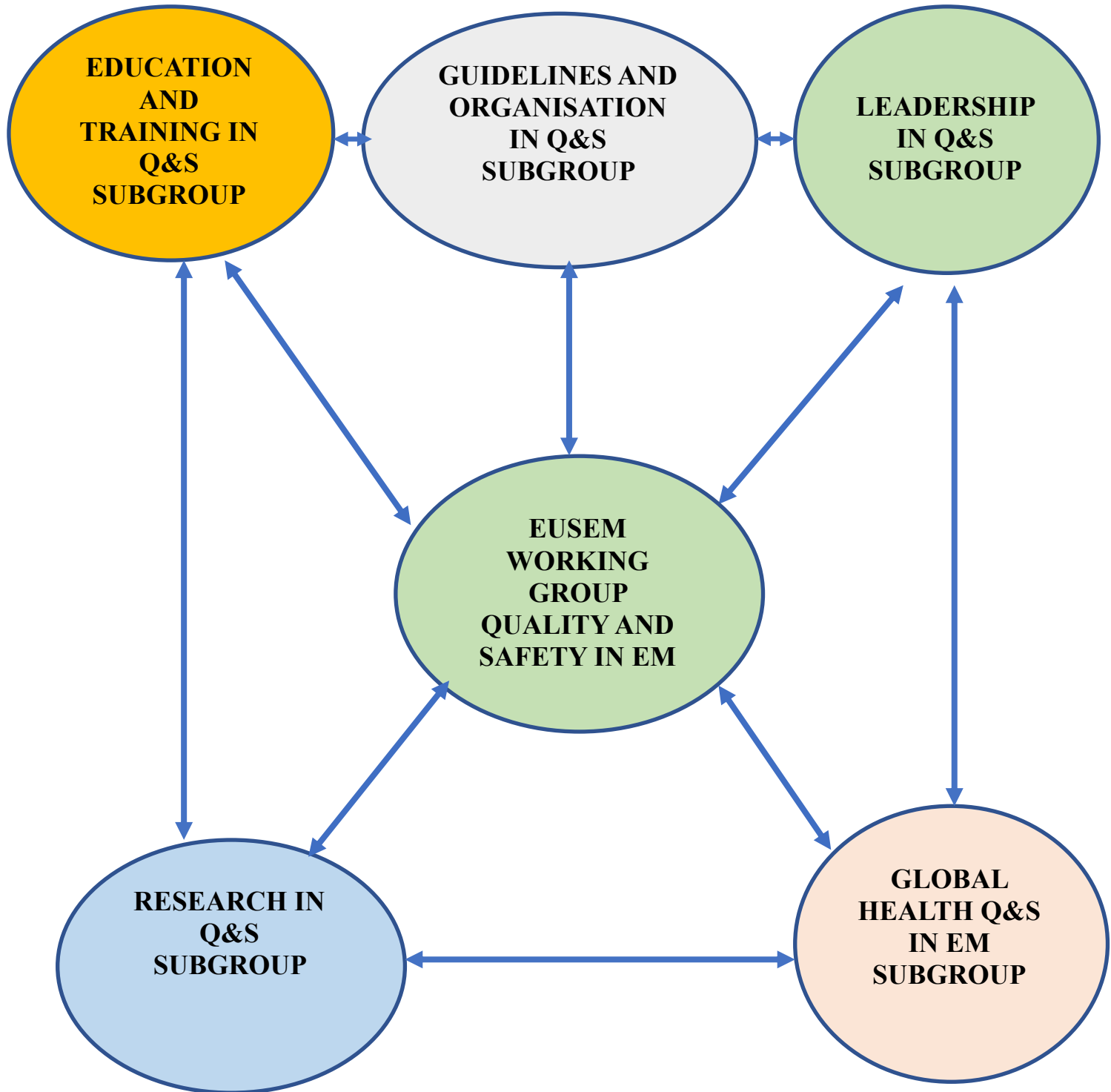


Figure 3: Research activities and collaboration (See research projects).

Global Health, Quality & Safety

Areas of Research: Risk factors, older patients, time and outcomes, culture safety, clinical Guidelines implementation, performances, technology (community network, artificial intelligence, tracking systems)

International Database Platform for EM HealthCare Systems comparisons

Europe: France, UK, Italy, Germany, Sweden, Spain, North America: USA, Canada, North Africa: Algeria, Tunisia, Morocco, West, East, and Sub-Saharan Africa: Ethiopia, Nigeria, Middle East: UAE, Lebanon, Asia: China

Finances

The EWQSEM Working Group will look at industry partnerships and grants following EUSEM policy. Courses and symposia or congresses could be a source of finances. A specific annual budget will be announced when the working group is operational. Most of the meetings will be done through Zoom or other tool and they will be free of charge. The group will meet face to face once a year during the EUSEM congress. If special meetings should be held at the EUSEM office, the EUSEM Executive Committee will be informed to discuss the budget if necessary. All publications (journals, books...) will be submitted under the name of EUSEM and should be free of charge. A meeting with ISQUA officials will be organized to set-up the collaboration between our EUSEM group and ISQUA. Expenses for this meeting will be defined with the finances officer.

Abbreviations

- ECQSEM: European Course on Quality and Safety in Emergency Medicine
- EUSEM: European Society for Emergency Medicine
- EWQSEM: EUSEM Working Group on Quality & Safety in Emergency Medicine
- EUMS: European Union of Medical Specialists
- EBEEM: European Board Exam in Emergency Medicine
- GNEM : Global Network on Emergency Medicine
- ICEQSEM: International Center for Excellence in Quality and Safety in EM Healthcare
- ISQUA: International Society for Quality in Healthcare
- ICQSEM: International Course on Quality and Safety in Emergency Medicine
- IMQSEM: International Master on Quality and Safety in Emergency Medicine
- Q&S: Quality and Safety

Objectives for Year 1 (2022-2023)

During Year 1, all subgroups of EWQSEM are formed and start to be active.

1. EUSEM White Book of Guidelines and Recommendations for Quality and Safety in Emergency Medicine (EWQSEM Guidelines and EWQSEM Leadership subgroups)

The book will include the relevant quality indicators that will be implemented in the pre-hospital setting and emergency department (ED). The objective is to include these indicators in the electronic healthcare record. Presentation of the book project at the EUSEM Congress 2022. We expect to achieve this goal in two years. The outline of the book should be ready in October 2022 with the objective to share the first draft of the white book on October 2023 to the EUSEM Board.

2. Start of the writing of the textbook on Quality and Safety in EM (EWQSEM Education/Training Subgroup).

Outline and list of contributors should be ready on October 2022. The goal is to share a first draft on October 2023.

3. Curriculum in Q&S in EM and implementation of the European Course on Quality and Safety in EM (EWQSEM Education/Training Subgroup).

A curriculum in Q&S in EM will be written and added to the revision of the European Curriculum in EM. This European course on Q&S in EM will be proposed for accreditation to EBEM and UEMS. A yearly program will be set-up during year 1 and the course will run every year.

4. Starting the collaboration with the International Society of Quality in Healthcare (ISQUA) (EWQSEM Research Subgroup).

A Memorandum of Understanding is in process to be signed by the two societies boards. A joint scientific session will be set-up with ISQUA.

5. Proposal of scientific sessions during the EUSEM congresses (EWQSEM Research Subgroup).

A session of five lectures distribute among the subgroups will be proposed. The objective will be to set-up this session at yearly EUSEM congresses.

We will invite experts from the International Society of Quality in Healthcare for joint sessions in up-coming congresses.

6. European Multicenter study on the association between emergency department length of stay and adverse events, and mortality (EWQSEM Research Subgroup).

The project is already written and a pilot study will be done through the EUSEM Research committee. It is planned to expand the study globally through international groups. A EU Research Council proposal will be planned with the aim to secure a FP7 grant support. Grants will help the EWQSEM to set up international research studies.

7. European Survey on Q&S (EWQSEM Research Subgroup).

The project is to get a descriptive picture on what is going in Q&S in Europe. A questionnaire will be send to all European national EM societies to support EWQSEM in getting data. Results of this study will be submitted to the European Journal of Emergency Medicine under the name of the group and European national societies.

Appendix 1: Time table for the Year 1: 2022-2023

May 2022	June 2022	July 2022	August 2022	September 2022	October 2022	November 2022	December 2022	January 2023	February 2023
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EUSEM White Book for Guidelines on Q&S in EM: October 2022 to October 2023



Curriculum on Q&S in EM and European Course on Quality and Safety in EM (The ECQSEM): June 2022 to February 2023



Collaboration between EUSEM and ISQUA: MOU in preparation




Collaboration between the working group and the IFEM interest group: Discussions started



EUSEM Congress in Berlin

ISQUA Congress in Brisbane

1. **International Multicenter Study EDLOS/Adverse events/Mortality: October 2022 to October 2023.**
 2. **Survey on Quality and Safety in EM in Europe: October 2022 to October 2023**
 3. **Collaboration with the Institute of Sciences in EM (A Bellou, China) and the Global Research Collaborative (VA Kumar, USA)**
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Objectives for Year 2 (2023-2024)

During Year 2, EWQSEM is stable and committed to achieve all goals.

1. Collaboration with the International Fellowship on Quality and Safety in EM (IFQSEM) (EWQSEM Education/Training and Global Q&S Subgroups)

The objective is to give the opportunity to EUSEM members, emergency physicians, nurses, administratives, and other clinicians to spend time during the fellowship in European and International EDs and gain experience in Q&S. They will also be involved in global health research programs.

2. European Course on Quality and Safety in EM (The ECQSEM) (EWQSEM Education/Training Subgroup)

The EWQSEM will run a course during the year 2 (October 2023) with the objective to share knowledge and experiences using new methods of medical education. The ECQSEM will move in Europe from country to country. Attendees will obtain a UEMS and EBEM certificate.

3. International Course on Quality and Safety in EM (ICQSEM) (Global Health Q&S)

The EWQSEM will collaborate with the ICQSEM.

4. Development of international research platform and databases on Quality and Safety in EM (EWQSEM Research Subgroup and Global Q&S)

During year 1 all research activities will be defined and will start with preliminary studies. The objective is to set up a research platform that will help EUSEM members to propose European and international research studies on Q&S.

5. Participation in the development of an International master on Quality and Safety in EM (EWQSEM Education/Training Subgroup, EWQSEM Research Subgroup, EWQSEM Global Q&S)

This is an important project that will strengthen our research activities. This project will be an opportunity for the development of EWQSEM.

6. Joint session between ISQUA and the EWQSEM

EWQSEM has the plan to set-up scientific sessions during the EUSEM and ISQUA congresses. The next congress of ISQUA will be held in October 2023 in Seoul, South Korea: <https://www.clocate.com/international-society-for-quality-in-health-care-isqua-international-conference/94579/>

7. Joint session between IFEM and EWQSEM

The group will collaborate with the IFEM Interest Group in Q&S to implement a joint session during the IFEM yearly congress.

8. Joint session between Global Network on EM (GNEM) and EWQSEM

The group will collaborate with GNEM to implement a joint session during the Emirati Critical Care and GNEM yearly congress in Dubai.

Appendix 2: Time table for the Year 2: 2023-2024

January 2023	February 2023	March 2023	April 2023	May 2023	June 2023	July 2023	August 2023	Sept 2023	October 2023	NOV 2023	DEC 2023
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International Fellowship on Quality and Safety in EM

European Course on Quality and Safety

EUSEM and International Research Platform and Big Databases on Quality and Safety in EM/ Set-Up Research studies

International Master of Science on Quality and Safety in EM/ International Center for Excellence in Quality and Safety

European and International Congresses: EUSEM, ISQUA, IFEM, GNEM

**Joint Session with GNEM at the ECC Conference Congress
Dubai, UAE**

Joint Session at the IFEM Congress

**Joint Session at the ISQUA Congress
Seoul, South Korea**

EWQSEM Sessions and Joint session with ISQUA at the EUSEM Congress

Objectives for Year 3 (2024-2025)

During this year, all activities of EWQSEM will be in place.

1. Publication of the Textbook on Quality & Safety in EM

The textbook will be ready.

2. Collaboration with the International Fellowship on Quality and Safety in EM (IFQSEM)

The IFQSEM will be set-up and the EWQSEM will collaborate with the leaders of this fellowship.

3. European Course on Quality and Safety in EM (The ECQSEM)

During year 3, the ECQSEM will be in the optimal and routine phase. EWQSEM will collaborate with the international Q&S Course (ICQSEM).

4. Development of international research platform and databases on Quality and Safety in EM

The research platform will be set-up.

5. Participation in the International master on Quality and Safety in EM (IMQSEM)

The IMQSEM will be set-up and EWQSEM will be involved.

6. Joint session between EWQSEM/ISQUA, EWQSEM/IFEM, EWQSEM/GNEM

The joint congress sessions will be routinely organized every year.

Appendix 3: Time table for the Year 3: 2023-2024

January 2024	February 2024	March 2024	April 2024	May 2024	June 2024	July 2024	August 2024	Sept 2024	Oct 2024	Nov 2024	Dec 2024
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Publication of the Textbook on Quality and Safety in EM

International Fellowship on Quality and Safety in EM

European Course on Quality and Safety

International Research Platform and Big Databases on Quality and Safety in EM/ Set-Up Research studies

International Master of Science on Quality and Safety in EM/ International Center for Excellence in Quality and Safety

European and International Congresses: EUSEM, ISQUA, IFEM, GNEM

**Joint Session with GNEM at the ECC Conference Congress
Dubai, UAE**

Joint Session at the IFEM Congress

**Joint Session at the ISQUA Congress
Seoul, South Korea**

EWQSEM Sessions and Joint session with ISQUA at the EUSEM Congress

Research projects 2022-2024

1. The Relationship between Emergency Department Length of Stay, Patient Safety Events, and Mortality: A proposal for a new emergency department process of care. The EUSEM International Emergency Department Time Network Study (IEDTNet). **Abdelouahab Bellou and Liza Kurland, Principal Investigators, Anna Khalemsky, David Shwartz, Zoubir Boudi, Karim Tazarourte, Eric Revue, Vijaya Arun Kumar, James Paxton, Dyonissios Tsilimingrass, Gabriele Savioli, Giovanni Ricevuti, Xi Li, Co-Investigators and Project network group.** Work in progress 2022.
2. Development of Big Data on Quality and Safety in EM. **Abdelouahab Bellou and Anna Khalemsky, Principal Investigators, Carlos Camargo, Shamai Grossman, Zoubir Boudi, Vijaya Arun Kumar, Co-Investigators, and Project network group.** Work in progress 2022.
3. EUSEM working group Survey on Quality and Safety in Emergency Medicine. **Abdelouahab Bellou, Principal Investigator, Anna Khjalemski, Zoubir Boudi, David Schwartz, Eric Revue, Karim Tazarourte, Gabriele Savioli, Giovanni Ricevuti, Co-Investigators, and Project network group.** Work in progress 2022.
4. EUSEM working group Survey on Quality and Safety in Emergency Medicine. **Abdelouahab Bellou, Principal Investigator, Zoubir Boudi, Eric Revue, Karim Tazarourte, Gabriele Savioli, Giovanni Ricevuti, Anna Khalemsky, Co-PIs.**
5. Development of Big Data on Quality and Safety in EM. **Anna Khalemsky, Principal Investigator, Abdelouahab Bellou, Carlos Camargo, Shamai Grossman, Zoubir Boudi, Vijaya Arun Kumar, Co-PIs.** Work in progress 2022.
6. Research project on the development of sensor technology for improving the process of care in the emergency department. **Abdelouahab Bellou, Principal Investigator, Zoubir Boudi, Laure Abensur Vuillaume, Vijaya Arun Kumar, Co-PIs.** Work in progress 2022.
7. Research on the development of virtual room in the emergency department to improve the coordination of care. **Abdelouahab Bellou, Principal Investigator, Zoubir Boudi (PhD student), Laure Abensur Vuillaume, Vijaya Arun Kumar Co-PIs.** Work in progress 2022.
8. Association between length of stay in the emergency department and in-hospital mortality: A systematic review and meta-analysis. Dominique Lauque; Anna Khalemsky; Zoubir Boudi; Linda Östlundh; Churchill Onyeji; Mohammed Alsabri; Jacqueline Cellini; Georges Intas; Kapil Dev Soni; Detajin Junhasavasdikul; Jose Javier Trujillano Cabello; Philippe Michel; Niels K Rathlev; Shan W. Liu; Carlos A Camargo; Martin Moeckel; Anna Slagman; Michael Christ; Adam J Singer, Charles-Henri Houze-Cerfon; Elhadi H. Aburawi; Karim Tazarourte; Lisa Kurland; Phillip D. Levy; James H. Paxton; Dionyssios Tsilimingras; Vijaya Arun Kumar; Eddy Lang; Gabriele Savioli; Shamai A. Grossman; **Abdelouahab Bellou (Principal Investigator).** In process for submission to BMJ, 2022.

9. Impact of teamwork and communication training interventions on safety culture and patient safety outcomes in the emergency department: a systematic review. Mohammed Alsabri, Dominique Lauque, Julia S Whelan, Churchill Onyeji, Nnamdi Nwauwa, Pauline Haroutunian, Philippe Michel, Shan Liu, Carlos A Camargo Jr, Martin Moeckel, Anna Slagman, David W Bates, Karim Tazarourte, Sara J Singer, Anita Toussi, Shamaï Grossman, **Abdelouahab Bellou (Principal Investigator)**. Journal Patient Safety, 2022.
10. Association between boarding in the emergency department and in-hospital mortality: a systematic review and meta-analysis. Zoubir Boudi, Dominique Lauque; Mohammed Alsabri; Linda Ostlenth; Guo Yu; Shan Liu; Carlos A Camargo; Adam Singer; Elhadi Aburawi; Karim Tazarourte; Shamaï Grossman; **Abdelouahab Bellou (Principal Investigator)**. PLOS ONE, 2019.
11. Analysis of risk factors involved in patients experiencing patient safety events occurring in the emergency department. Mohamed Alsabri; Taoufik Zoubeida; Ibrahim Abdallah, Churchill Onyeji; Liu Shan, Carlos Camargo; Philippe Michel, Karim Tazarourte; Shamaï Grossman; **Abdelouahab Bellou (Principal Investigator)**. Journal of Patient Safety, 2022.
12. Michael Khalemsky (**Co-Principal Investigator**); Abdelouahab Bellou (**Co-Principal Investigator**); Mehmet Akif Karamercan; Martin Moeckel; Luis Garcia Castrillo; David G. Schwartz (**Principal Investigator**). Physicians' attitudes towards smartphone-based Emergency Response Communities for Anaphylaxis: Survey. Health Policy and Technology 2021; S2211-8837(21)00103-9, [10.1016/j.hlpt.2021.100580](https://doi.org/10.1016/j.hlpt.2021.100580).
13. Development of Emergency Community Response using mobile app. **David G. Schwartz, Abdelouahab Bellou, Michael Khalemsky, Principal Investigators, and Project network group**. Work in progress, 2022.
14. Analysis of risk factors involved in 72 hours' emergency department return visits experiencing patient safety events. **Abdelouahab Bellou, Shamaï Grossman, Anna Khalemsky, Principal Investigators, Churchill Onyeji, Zoubir Boudi, Vijaya Arun Kumar, Eric Revue, Karim Tazarourte, Gabriele Savioli, Giovanni Ricevuti, Co-Investigators, and Project network group**. Work in progress, 2022.
15. Analysis of risk factors involved in 72 hours' emergency department return visits in older patients over 65 years old experiencing patient safety events. **Abdelouahab Bellou, Shamaï Grossman, Anna Khalemsky, Principal Investigators, Churchill Onyeji, Zoubir Boudi, Vijaya Arun Kumar, Eric Revue, Karim Tazarourte, Gabriele Savioli, Giovanni Ricevuti, Co-investigators, and Project network group**. Work in progress, 2022.
16. Analysis of risk factors involved in older patients experiencing patient safety events occurring in an emergency department. **Abdelouahab Bellou, Shamaï Grossman, Anna Khalemsky, Principal Investigators, Churchill Onyeji, Zoubir Boudi, Vijaya Arun Kumar, Eric Revue, Karim Tazarourte, Gabriele Savioli, Giovanni Ricevuti, Co-investigators, and Project network group**. Work in progress, 2022.

17. Association between boarding time in older patients visiting the emergency department and in-hospital mortality. **Abdelouahab Bellou, Shamaï Grossman, Anna Khalemsky, Principal Investigators, Churchill Onyeji, Zoubir Boudi, Vijaya Arun Kumar, Eric Revue, Karim Tazarourte, Gabriele Savioli, Giovanni Ricevuti, Co-investigators, and Project network group.** Work in progress, 2022.
18. Impact of length of stay on in-hospital mortality in older patients visiting the emergency department: identification of risk factors. **Abdelouahab Bellou, Shamaï Grossman, Anna Khalemsky, Principal Investigators, Churchill Onyeji, Zoubir Boudi, Vijaya Arun Kumar, Eric Revue, Karim Tazarourte, Gabriele Savioli, Giovanni Ricevuti, Co-investigators, and Project network group.** Work in progress, 2022.