

# Road Traffic Related Injury Research and Informatics

## New Opportunities for Biomedical and Health Informatics as a Contribution to the United Nations' Sustainable Development Goals?

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Medical informatics, biomedical informatics, health informatics, accident research, injury research, multidisciplinary research

### Summary

The United Nations has recently adopted 17 sustainable development goals for 2030, including ensuring healthy lives and promoting well-being for all at all ages, and making cities and human settlements inclusive, safe, resilient and sustainable. Road injuries remain among the ten leading causes of death in the world, and are projected to increase with rapidly increasing motorisation globally. Lack of comprehensive data on road injuries

has been identified as one of the barriers for effective implementation of proven road safety interventions. Building, linking and analysing electronic patient records in conjunction with establishing injury event and care registries can substantially contribute to healthy lives and safe transportation. Appropriate use of new technological approaches and health informatics best practices could provide significant added value to WHO's global road safety work and assist Member States in identifying prevention targets, monitoring progress and improving quality of care to reduce injury-related deaths. This paper encourages the initiation of new multidisciplinary research at a global level.

healthy lives and promote well-being for all at all ages, with target 3.6 to “By 2020, halve global deaths and injuries from road traffic accidents”. This target can be partially assessed with the indicator “mortality rate from road traffic injuries” in the World Health Organization's 2015 global reference list of 100 core health indicators ([3] p 36). SDG 11 is to “make cities and human settlements inclusive, safe, resilient and sustainable” with target 11.2 to “By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons”.

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## 2. On Road Traffic Injuries and Research

Road injuries are among the 10 leading causes of death in the world, and are projected to increase with rapidly increasing motorisation globally [4]. The World Health Organization (WHO) highlights that “1.24 million people die each year as a result of road traffic crashes” [5] and that nearly “3,400 people die on the world's roads every day” [6]. In addition, there is an extraordinary burden of short- and long-term disability associated with non-fatal injury, especially among vulnerable populations: “Tens of millions of people are

## 1. On Road Safety and Sustainable Development Goals

Improving global road safety is a public health priority. In August 2015, the United

Nations (UN) Member States agreed on 17 sustainable development goals (SDGs [1, 2]). It is expected that these goals will be presented and discussed at the UN General Assembly in September 2015. Each Goal is specified by several targets, described as measurable indicators. SDG 3 is to „ensure

injured or disabled every year. Children, pedestrians, cyclists and older people are among the most vulnerable of road users” [6]. Without doubt, implementing safer transportation systems and improving road safety (recall SDG 11) will contribute to healthy lives and well-being (recall SDG 3).

Public health initiatives on road traffic injury have spanned decades, with increasing interest on the use of injury event and injury care data to identify both prevention targets and clinical management gaps. These data inform a range of efforts, from vehicle safety and road infrastructure initiatives, to injury care quality improvement programmes. Globally, WHO is strongly engaged in this field, in collaboration with many other organizations, and among other activities, monitors road safety by publishing global status reports [6, 7].

### 3. What Could Biomedical and Health Informatics Add?

As research on road traffic injuries is well established, what could health informatics research contribute in this context?

Current knowledge on road traffic injury in most of the world depends on limited collision event documentation and scattered facility-based registries. Lack of comprehensive data on road traffic injuries has been identified as one of the barriers for effective implementation of proven road safety interventions. Patient-centered care coordination through computer-supported health information systems has become a key topic in informatics research and practise [8], and automated extraction from electronic patient records is now technically possible. The capacity to link to information from electronic patient records is profoundly underutilised in injury research. Accessing these data would improve our understanding of injury events, health system architecture and injury management, and facilitate identification of targets for prevention. Aggregating anonymised clinical data from clinical information systems in an international registry and linking this to other sources of event data would provide substantial global public health benefit.

Such activities are often subsumed under the term eHealth, and supported by WHO’s 2005 eHealth resolution [9, 10] and subsequent resolutions like the one on eHealth standardization and interoperability [11]. Many additional activities could be initiated worldwide [12].

Building, linking and analysing electronic patient records in conjunction with establishing injury event and care registries can contribute substantially to healthy lives and safe transportation. Use of these new technological approaches could provide significant added value to WHO’s global road safety work and assist Member States in identifying prevention targets, monitoring progress and improving quality of care to reduce injury-related deaths. Innovative approaches in road safety data collection and management will allow us to harness available data and facilitate evidence-based interventions to improve public health and road safety.

### 4. Time for a Paradigm Shift?

Recent developments in information and communication technology [13] and in information processing methodologies have the potential for substantial impact on global public health. Although there are certainly barriers and challenges, and near term results will be limited in scope, the potential benefits far outweigh the challenges.

The time has come to assess the feasibility of multinational road traffic injury registries, based on combined data from collisions and electronic health records of injured persons. The minimum data elements, proposed in *Data systems: A road safety manual for decision-makers and practitioners* [14], section 3.3 as well as the Minimum Data Set for Injury soon to be released by WHO, may be a good start in identifying a common basic data elements.

In addition, feasibility studies on mechanisms for linking such data will be essential. While the paucity of the information systems infrastructure in low and middle income countries is still one of the main challenges for such implementation, development of data-linking mechanisms

should be initiated in settings where there is an established data infrastructure not only for electronic health records, but also for other data sources, e.g. on transport systems, vehicle and roads.

The availability of sophisticated information and communication technology infrastructure is rapidly expanding in low- and middle-income settings, and the information system architecture for optimising its utilisation for public health should be fully developed and feasibility tested in parallel with this expansion. Rather than allowing the current system limitations in low and middle income settings to inhibit eHealth initiatives, we must both facilitate infrastructure development and anticipate its evolution by having well-developed injury information systems in place that can be utilised as soon as technical infrastructure is in place. In addition, feasibility research in high-income countries can aid in priority-setting and inform the targeted development of systems in limited-resource settings.

Priority research would also include development of methods for data analysis and knowledge discovery for collisions and injuries; comparisons among different existing injury databases; development of taxonomies to classify road traffic collisions and injuries, and systematise the representation of injury events in electronic health records; compilation of global statistics and publishing analytical reports; as well as elaborating training and orientation materials and developing policy briefs.

### 5. Comments Are Welcome

With this paper we hope to stimulate an interdisciplinary discussion on injury research and the potential contribution of informatics. We invite you to participate in this discussion by sending messages to the journal’s social media platforms or by writing letters to the editor. More substantially, we would like to encourage new collaborative research initiatives, increased exchange on existing research and sharing of case studies on informatics approaches for injury research.

In our opinion, joint research activities of informatics departments, experienced in

research in trans-institutional health information systems and in registries, in close collaboration with relevant WHO departments and in coordination with existing injury research groups, could significantly contribute to achieving the UN SDGs on healthy living and safe transportation, as well substantially facilitate WHO's global road safety work.

## References

1. United Nations. Transforming our World: The 20130 Agenda for Sustainable Development. August 12, 2015. Sam K. Kutesa, President of the General Assembly (letter).
2. United Nations. Open Working Group for Sustainable Development Goals. <https://sustainabledevelopment.un.org/focussdgs.html>. Last access: August 19, 2015.
3. World Health Organization. 2015 Global Reference List of 100 Core Health Indicators. Geneva: World Health Organization; 2005. <http://www.who.int/healthinfo/indicators/2015/en/>. Last access: August 19, 2015.
4. World Health Organization. The top 10 causes of death. <http://www.who.int/mediacentre/factsheets/fs310/en/>. Last access: August 19, 2015.
5. World Health Organization. Media Road traffic injuries. <http://www.who.int/mediacentre/factsheets/fs358/en/>. Last access: August 19, 2015.
6. World Health Organization. Violence and Injury Prevention. Road traffic injuries. [http://www.who.int/violence\\_injury\\_prevention/road\\_traffic/en/](http://www.who.int/violence_injury_prevention/road_traffic/en/). Last access: August 18, 2015.
7. Harvey A, Towner E, Peden M, Soori H, Bartolomeos K. Injury prevention and the attainment of child and adolescent health. *Bull World Health Organ*. 2009; 87: 390–394.
8. Séroussi B, Jaulent MC, Lehmann CU. Health information technology challenges to support patient-centered care coordination. *Yearb Med Inform*. 2015; 10: 8–10.
9. Resolution WHA58.28. eHealth. In: Fifty-eighth World Health Assembly, Geneva, May 16–25, 2005. Resolutions and decisions, annex. Geneva: World Health Organization; 2005: 108–110. [http://apps.who.int/gb/ebwha/pdf\\_files/WHA58-REC1/english/A58\\_2005\\_REC1-en.pdf](http://apps.who.int/gb/ebwha/pdf_files/WHA58-REC1/english/A58_2005_REC1-en.pdf). Last access: August 19, 2015.
10. Healy JC. The WHO eHealth Resolution. *eHealth for All by 2015? Methods Inf Med*. 2007; 46: 2–3.
11. Resolution WHA66.24. eHealth Standardization and Interoperability. In: Sixty-sixth World Health Assembly, Geneva, May 27, 2013. Resolutions and decisions, annex. Geneva: World Health Organization; 2013: A66/VR/9. [http://www.who.int/ehealth/events/wha66\\_r24-en.pdf](http://www.who.int/ehealth/events/wha66_r24-en.pdf). Last access: August 19, 2015.
12. Al-Shorbaji N. The World Health Assembly Resolutions on eHealth: eHealth in support of universal health coverage. *Methods Inf Med*. 2013; 52: 463–466.
13. de Assis Moura L Jr. Embracing Strategies for eHealth. *Yearb Med Inform*. 2015; 10: 1.
14. Data systems. A road safety manual for decision-makers and practitioners. Geneva: WHO Press; 2010. <http://www.who.int/roadsafety/projects/manuals/data/en/>. Last access: August 19, 2015.

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