Medical errors and adverse events: leading cause of death and disease burden

Professor Dolores Cahill outlines opportunities to reduce medical error and adverse events in primary, ambulatory and hospital healthcare settings to benefit patients and save costs

Medical error is the third commonest cause of death, accounting annually for one in ten deaths (251,454 deaths) in the USA. This is behind causes of deaths from heart disease (611,105 deaths) and from cancer (548,881 deaths). One in ten hospitalisations in OECD countries results, on average, in safety failures causing patient harm or an adverse event. These figures are 2.5 times higher than the 98,000 deaths identified in the USA Institute of Medicine (2000) report ‘To Err is Human’, where death due to medical error then was still ‘more than die from motor vehicle accidents, breast cancer, or AIDS – three causes that receive far more public attention. Indeed, more people die annually from medication errors than from workplace injuries.’

Medical error causing death is where the death is caused by the healthcare intervention and not by any underlying patient condition. Medical error can also result in injury or harm to patients. Harm is any unintended and unnecessary harm to a patient caused by, or resulting from, healthcare. It can be caused by a specific incident (adverse event) or a cascade of events (miscommunications, delays, errors or omissions) which may be individually innocuous, but collectively result in harm, injury or death. The WHO defines patient harm as ‘impaired function of a patient due to the treatment, failure to adhere to a prescribed medication regimen, or failure to prevent a complication of a disease or injury’.

Burden and costs to patients and their families

The medical error and/or adverse event can occur in primary care settings, in ambulatory care and/or in hospital settings where a patient receives any one, or a combination, of the following: diagnosis, diagnostic tests, treatment, procedure, surgery, intervention, medicine, and includes continued monitoring of health and disease over time. The most harmful errors for patients relate to errors in diagnosis, surgery, prescriptions and the use of medicines.

The recent OECD reports ‘The Economics of Patient Safety – Strengthening a value-based approach to reducing patient harm at national level’ (2017) and ‘The Economics of Patient Safety in Primary and Ambulatory Care’ (2018) identify:

- On average, one in ten hospitalisations results in safety failure or adverse events
- The contribution of safety lapses in primary and ambulatory care adversely affect up to 20-25% of the general population in developed and developing countries
- As many as 40% of patients experience safety and adverse issues in primary and ambulatory care.

When these burdens are combined, medical errors contribute significantly to death rates, disease burden and reduced quality of life of patients in OECD countries, including Europe, the UK and USA. In 2018, a UK Government-commissioned report found the NHS annually contributes up to 22,300 deaths in England by making hundreds of millions of prescribing errors and mix-ups, failures to properly monitor patients on powerful drugs, poor communication between GPs and hospitals, and giving patients the wrong medication.

Burden and cost in healthcare settings

The socioeconomic costs of medical error and safety lapses are a significant cause of death and disease burden in OECD countries, as well as increased healthcare costs. The direct costs of harm in the primary care and ambulatory care settings account for ~2.5% of the total health expenditure. The extra costs are for additional tests, treatments and additional hospitalisations, accounting for over 6% of hospital bed days in OECD countries annually and over seven million admissions. This is in addition to the 15% of acute care activity caused by harm occurring in hospitals alone. Combined, this is approaching 17.5% of the healthcare costs in OECD countries and 3% of GDP in developed countries.

Disease burden and reduction in quality of life

In addition to being the third leading cause of death, medical error and adverse events contribute to a reduction in quality of life of patients. Medical error is the 14th leading cause of the global disease burden, equivalent to the disease burden caused by malaria, TB and some cancers, such as thyroid cancer or malignant melanoma. In developing countries, the burden to patients caused is comparable to typhoid fever. The most harmful errors for patients relate to errors in diagnosis (incorrect or delayed diagnosis – diagnostic error), a delay in indicated/necessary treatment, prescription errors, errors related to the use of medicines, adverse drug events (harmful medication errors) and surgery-related errors.

Need to systematically report and study medical error and adverse events

In healthcare settings, healthcare systems and health technology assessments, there is an increasing need to comprehensively and systematically study medical error and the resulting patient harm, injury and death. The prevalence, costs and economic burden have been calculated in the ‘Prevalence and Economic burden of Medical Errors in the NHS in England’ (2018), which found that 237 million medication errors occur at some point in the medication process in England per year. It is estimated 72% have little/no potential for harm and that many errors are picked up before they reach the patient, but it is not known how many. This report further estimates that:

- 66 million potentially clinically significant errors occur per year, 71% of which occur in primary care, where most medicines are prescribed and dispensed
- Prescribing in primary care accounts for 33.9% of all potentially clinically significant errors
Harm from avoidable adverse drug reactions (ADRs) was estimated (although acknowledged to be from studies over ten years old):
- Primary care ADRs leading to a hospital admission (£337.7m (~€950m), causing 627 deaths)
- Secondary care ADRs leading to a longer hospital stay (£1.48m, causing 85 deaths and contributing to 1,081 deaths)
- Non-steroidal anti-inflammatory drugs, anticoagulants and antiplatelets cause over a third of admissions due to avoidable ADRs. Gastrointestinal (GI) bleeds are implicated in half of the deaths from primary care ADRs.

Burden and cost to healthcare professionals

Incidences of medical error and adverse events are also a burden to healthcare professionals and healthcare organisations, including in areas requiring complex care such as Accident and Emergency, complex surgery and intensive care units. Litigation from patients or their families is a concern and a significant cost. Integration of reporting into electronic healthcare records, healthcare systems and artificial information hospital systems will facilitate identifying contributory aspects to the error, including due to long working hours, overcrowding and under-staffing.

Medical staff need to be supported to recognise the medical error or adverse event, even when it is identified weeks or months following the medical intervention, such as is emerging in cancer immunotherapy, as an example. The FDA has approved checkpoint inhibitors and CAR T-cells as immunotherapy in cancer. This immunotherapy treatment can cause a new disease, colitis – an adverse event in 44% of patients – that can be so severe it can cause death within weeks of just one immunotherapy treatment. This area has been recently reviewed by Protagen AG. Protagen’s SeroTag technology generates clinically relevant immune-related adverse event (irAE) profiles of patients, which has the potential to provide novel insights into the treatment, the response of patients, the modes of action and even identity and predict irAE profiles, biomarkers and signatures to reduce patient adverse events and simultaneously reduce healthcare costs. In the 2018 NHS in England study, the cost of medication errors ranged widely, from £67.93 per incorrected error for inhaler medication to £6,927,078.96 for litigation claims associated with anaesthetic error.

Opportunities for reduction and improvements - WHO ‘10 facts on Patient Safety’

Since half of the global disease burden arising from patient harm, medical errors and adverse events originating in primary and ambulatory care is due to inadequate training, poor communication, cleanliness and hand washing, misidentification of patients for treatment and surgery, there are opportunities for significant improvement. Up to 80% of this harm in primary and ambulatory settings can be avoided. In the ‘10 Facts on Patient Safety’ (2018), the World Health Organization highlights the cost of prevention of medical error is much less than the cost of treating the failure:
- Hospital infections affect 14 out of every 100 patients admitted, and simple and low-cost hand washing procedures can reduce these infections by 50%
- Delivery of safe surgery requires a teamwork approach; errors during the 234 million global surgical operations annually contribute significantly to the global disease burden, despite 50% being avoidable
- About 20-40% of all health spending is wasted due to poor-quality care
- There is a poor safety record for healthcare. Other industries with a perceived higher risk, aviation and nuclear industries, have much better safety records than healthcare

Training and continuous professional development to reduce medical error

Awareness raising of medical error will reduce it by including this in the training and continuous professional development of healthcare professionals and management in healthcare organisations, regulatory bodies and appointed professionals in policymaking, public health, pharmacies, post-marketing surveillance, autopsy reporting, coroner services, legal and courts systems, and governing councils in national, regional and global authorities.

Opportunities for reduction - electronic patient records, Artificial Intelligence, integrated and value-based healthcare systems

The integration of electronic patient records, Artificial Intelligence and value-based healthcare systems can further reduce medical errors in prescribing, diagnosis and communication between healthcare professionals and administrative systems, as well as reducing costs: a win-win.

P4 Medicine, as pioneered by Leroy Hood, is applying predictive, preventive, personalised and participatory (P4) medicine with patient involvement and wellness coaching, which is demonstrating positive health outcomes for patients and reducing costs.

In conclusion

The socioeconomic benefits of improving patient safety are compelling. By systematically identifying, reporting and analysing medical errors and adverse events, there are significant opportunities to reduce patient deaths, disease burden, illness, disability and lost productivity while simultaneously reducing healthcare costs to patients, insurance companies, healthcare systems and governments.

References

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