The challenges of estimating the cost of traumatic brain injury worldwide

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Editors' note: The cost estimates are an important aspect of trauma care, especially in the context of international financial stability and public health initiatives. The identification of motorized cycling as a major mechanism of injury in Malaysia or indeed nationwide can be used to advocate for effective expenditure of resources on preventive measures such as educational programs, safety initiatives, and even government actions aimed at reducing motorcyclist crashes.
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overall quality of care as well. For this center, targeting rate reductions for pneumonia and decubitus ulcers as the most common complications cited will not only improve clinical outcomes but will cost less, as pneumonia was an independent predictor of higher cost.

Finally, models for gathering data and performing economic analyses like the one done here will aid other countries. Particularly in those nations in which road traffic is increasing, people are susceptible to vehicle-related injury as traffic outpaces the growth of infrastructure, regulations, emergency services, and trauma systems. By collecting data on mechanism of injury, severity of injury, and the cost of care by age, procedure, complication rates, and the like, guidance can be provided to health authorities and medical providers. Health authorities can place resources where they are needed, and medical providers can focus clinical efforts on specific care improvements.

Although the World Health Organization (WHO) adopted standards for central nervous system injury surveillance in 1993, repositories of data regarding injury and both its direct and opportunity costs still contain limited information and have not adequately addressed the many confounders of ascribing true cost to a complex injury. It is critical, as registry science evolves and databases are deployed, to include at least some markers of cost of care. However, the vagaries of using billing code–based data are well known and little data exist on TBI coding accuracy. Studies do support the notion that International Classifications of Diseases (ICD) coding is insufficient for accurate characterization of epidemiological data in TBI. Numerous studies of other medical conditions have confirmed this finding. The authors rightly point out that the collection of flawed direct financial cost data may lead to “unfair comparisons and flawed policy choices.” The use of strictly administrative data such as ICD codes, while informative, should not directly drive policy decisions, but should be taken together with other forms of data collection to help medical communities, health authorities, and payors make decisions about optimal care.

As You and colleagues have also pointed out, the true costs of care go far beyond those associated with hospitalization. While hospital costs can be gleaned more readily, the cost of rehabilitation, home modifications, home care, and follow-up for multiple aspects of recovery are typically difficult to capture. Furthermore, the opportunity costs of lost productivity not only by the patient but also family and friend caregivers is, while not completely intangible, not easy to estimate. Actuarial science can aid in the development of expected opportunity costs for given injuries, and other social sciences fields must be engaged to assist in these predictions.

This particular study only included individuals up to the age of 60 years. When considering the increasing older population worldwide, cost estimations must be adjusted to include lower opportunity costs for shorter life expectancies and earning potential of older individuals. The direct costs of care in older populations with comorbidities would, however, be anticipated to be higher. Indeed, in this particular study, the older the patient by increments of 1 year, the higher the cost of care. Population data collection via census mechanisms, together with injury rate data, can be added to data such as those presented here to predict overall cost of care anticipated from TBI for a given municipality, region, or country.

Perhaps most importantly, discussions of cost of care should not presume that patients do not benefit from treatment, nor should there be a presumption that they do not return to productivity. Indeed, aggressive management can lead to quite good functional outcomes and may be worth not only the financial costs to society, but all of the time, energy, and effort that goes into the complex management of TBI. We must not lose sight of our humanity in our decision-making or of the importance of aggressive medical care in rendering patients back to functionality. Early prognostication abilities for TBI in particular are limited, and the neurotrauma research community must continue to push for better prognostic tools and treatment methods for TBI. Certainly, caution must be employed in the interpretation of purely economic data not to advocate for a nihilistic approach to care, lest the practice of non-aggressive management lead to a self-fulfilling prophecy of poor outcomes.

In summary, efforts to assess the cost of care of TBI are challenged by incomplete or inaccurate databases, complexity of clinical care, lack of epidemiological data, and scant use of actuarial cost prediction methodologies. This study represents an early attempt to document costs of care of TBI in one regional medical center in Malaysia, but will hopefully lead to other such analyses worldwide and redoubled efforts by public health bodies to focus on the epidemic of TBI-related morbidity and mortality by supporting data collection, appropriate emergency services, acute care, and after-care through functional survival and community reintegration.

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References


Disclosures

The authors report no conflict of interest.