Economic Impact Model for the Development of a Statewide Trauma System in Georgia

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The detrimental impact of trauma in the United States cannot be overstated. Statistically, trauma represents the fourth-leading cause of death among all Americans, and is the leading cause of death for those under the age of 44. Trauma is the most significant cause of disability and a major contributor to both loss of productivity and increased health care costs. These injuries have enormous financial, physical, emotional and social effects not only on the individual, but on their family, community and society as well. Trauma cost the American public $399 billion in 1992, including lost wages and productivity, medical expenses, administrative costs and employer expenses.

The State of Georgia currently lacks a comprehensive statewide trauma system. At present, only 14 of the 152 hospitals in the state are equipped to handle traumatic injuries, of which four are Level 1 and seven are Level 2 trauma centers. Although there are an estimated 35,000 to 45,000 cases of trauma in Georgia annually, the Georgia Department of Human Resources reports that only 9,612 patients (30 percent) received care at one of the 14 designated trauma centers. There is currently no central command for trauma centers and currently no state funding for a trauma/EMS program. Neither is there any certainty that the present trauma arrangements are sustainable in the face of ever-increasing health care expenses.

The need for a statewide coordinated trauma system in Georgia has become apparent in recent years. The Joint Comprehensive State Trauma Services Study Committee, created during the 2006 Legislative Session, concluded that “our state is in a trauma care crisis.” Many observers have described the negative impact of a deficient statewide trauma system. Unfortunately, a surprising dearth of prospective economic statistics exists, which hinders a full assessment of trauma-related health care costs. Accordingly, the longterm financial impact of additional trauma health care expenditures can be difficult to understand when health care decision makers contemplate cost-benefit ratios.

As a result of the absence of direct economic information, a more indirect and hedged hypothetical cost analysis seems appropriate. The following is an analysis of the potential financial benefits that might correlate with an improvement in the state trauma system. We postulate that a coordinated statewide trauma system would reduce trauma-related morbidity and mortality and reduce health care costs by returning citizens to productive labor, thereby increasing local and state tax revenue over the longterm.

We obtained injury mortality data for the State of Georgia and years of productive life lost (YPLL) for the year 2003 and compared these to national averages. Extracting from such figures, lifetime personal income and state tax revenue losses were calculated and compared to what might occur if a centralized well-funded trauma network enabled Georgia to lower its trauma-related death rate to the national average. Using a multiplier effect, we projected the greater societal impact of such improvements. Assuming an initial investment of $100 million by the State to establish a coordinated statewide trauma system, we calculated the estimated return on this investment. A rigorous prospective methodology and study of these trauma costs would certainly provide more accurate figures.

Trauma Mortality Statistics

As reported by the Georgia Health Bureau, Georgia’s 2003 age adjusted trauma-related mortality rate of 65 deaths per...
100,000 was significantly higher than the national average of 56 per 100,000. Georgia’s mortality rate is presented in Figure 1 and compared with national averages.

The rate of deaths in Georgia was even higher among citizens in their productive years (age 20 – 64) at a rate of 66 per 100,000, compared to a national average for this age group of 61 per 100,000. These increased trauma-related mortality rates in Georgia translated to a 9 percent higher death-rate in the productive years age group, and 14 percent higher death-rate in all age groups compared to the national average. The 5,336 total trauma-related deaths that occurred in 2003 are represented in Figure 2.

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Georgia’s total state personal income level at $34,058/person for 2007. Multiplying the YPLL (122,317) by state per capita personal income ($34,058), produces an estimated lifetime income lost in Georgia of approximately $4.17 billion per one-year of all trauma deaths. Failing to successfully lower the death rate by 14 percent to the national average translates into an estimated lifetime income lost of $583 million as a result of one-year of trauma deaths.

The loss of potential personal income impacts not only the individual, but also the state. Using the $583 billion approximation of lifetime income lost as a result of one-year of trauma deaths over the national average, we can estimate the lifetime revenue the state fails to collect. Georgia collected approximately $98 in state and local taxes per $1,000 (9.8%) of personal income in 2002. Using this gross figure of 10%, we calculate that an additional $58.3 million in state and local tax collections might be obtained over the lifetime of those individuals saved from trauma-related death in one year. With each new year, this figure would increase exponentially as those who have returned to living productive lifestyles in past years continue to contribute to local and state tax collections, adding to the tax collections from those who return to productivity in a given year.

We apply the same measures to calculate the lifetime income lost and tax collections lost as a result of severe disability. Using the ratio of 3:1 mentioned above (three severe disabilities for every one trauma-related death), we calculate approximately $12.5 billion in lost lifetime income and $1.25 billion in lost tax collections as a result of trauma-related severe disability in a one year period. Failing to successfully lower the severe disability rate by 14% translates into an estimated $1.75 billion in lifetime income lost, and $175 million in tax collections lost, as a result of one-year of trauma severe disability.

The savings achieved by lowering the trauma death and severe disability rates by 14 percent are presented in Figure 3.

Figure 2: Georgia trauma mortality data patients by age group (2003).

Trauma Disability Statistics

The US Census Bureau reports that 1.45 million people in Georgia live with a disability. Of these, 940,344 are in the “productive years” age group of 20-64, and only 57.3 percent of these are employed.

For every one trauma-related death, approximately three individuals are severely disabled and 75 are temporarily disabled. Extrapolating from Georgia’s 5,336 total deaths in 2003, these disability rates translate to 16,008 severely disabling and 400,200 temporarily disabling trauma-related injuries on an annual basis. For the purposes of our study, we classify those with severe disabilities as those unable to return to productive lifestyles. We presume that those with temporary disability will successfully return to productivity after a reasonable period of recovery.

Years of Productive Life Lost

Calculating years of potential life lost (YPLL) provides an estimate of the years of life lost due to death, making use of average life expectancy as a predictor for the total length of life. Using Centers for Disease Control and Prevention’s figures for 2003, we calculate the YPLL (secondary to trauma mortality) of those in their “productive years” in Georgia to be 122,317.

Matching this YPLL figure with the state’s per capita income provides an estimated total lifetime loss in personal income as a result of one-year of trauma mortality. The most recent report by the US Bureau of Economic Analysis lists

Figure 3: lifetime personal income earned and state tax collections if trauma death and severe disability rates are improved by 14%.
Multiplier Effect

A statistically powerful factor is the multiplier effect. Multiplier effects occur when an increase in spending or investment produces an increase in income or consumption that is proportionally greater than the initial amount spent. In this study, a multiplier effect can be considered to determine the longterm societal impact as a result of the enhanced productivity of those who are spared from trauma-related death or severe disability.

Without a definitive data point to determine the multiplier effect of a comprehensive statewide trauma system on determined income or tax, we utilize a value of 2.33 from a 2003 Morehouse School of Medicine Economic Impact Study.11 Using this multiplier effect of 2.33 in combination with the personal income and tax collection figures derived above produces a perspective on the broader impact of returning individuals to productive lifestyles. With the multiplier effect in mind, lowering the trauma-related death and severe disability rate by 14 percent for one year produces a combined lifetime personal income earnings impact of $5.44 billion and a combined lifetime tax revenue impact of $543 million. These data are represented in Figures 4 and 5.

A Worthwhile Return on Investment

Studying these figures, it is possible to provide an estimated return on the state's investment into a trauma system. Assuming a $100 million initial investment is successful in lowering death and severe disability by 14 percent in one year, the state might expect an 18 percent one year return and 543 percent lifetime return on investment.

For better or worse, economic realities have a substantial bearing on health care decision-making. Financial support for a comprehensive trauma system generally falls into the hands of state leaders, as Federal policy-makers can only indirectly involve themselves and local entities often have fewer resources with which to invest in such systems. Presently, the Georgia trauma system faces enormous economic pressures on many fronts. If no action is taken, fiscal realities suggest that Georgia's trauma mortality and morbidity rates may well worsen rather than improve, to the detriment of all.

The unique nature of trauma places additional stresses on the system. Trauma victims must be dealt with quickly and be provided with access to appropriate intensive and specialized care. After initial treatments, extensive efforts are made to effectively return patients to productivity. Many of these components depend on a smooth interflow of patients from one location or level of care to another. Unfortunately, economic barriers within the system make this difficult at times. From a caregiver perspective, the burden of uncompensated health care discourages many institutions from involvement in trauma health care system. Additionally, many physicians avoid arduous emergency room responsibilities involving trauma both out of fear of litigation and concern over compensation.

Legislative entities have been reluctant to involve themselves in funding trauma care out of concern that the state may become obligated to support such a system with scarce tax dollars.

It is vital to view such spending as an investment with substantial longterm returns rather than as a pure expense. The longterm economic benefits of effectively restoring the younger population to productivity are clear; by regaining years that potentially would have been lost, these individuals subsequently make great societal contributions and provide the state with a worthwhile return on its initial investment. More economic analyses are needed to demonstrate the precise economic benefits. This positive correlation between a strong health care system and productivity should always be considered when health care decisions are made, not only for trauma, but also on a global scale.

Our results suggest that investing in a statewide trauma system may improve the survival and productivity of the Georgia’s citizens, and also yield a longterm financial benefit to the state through increased state tax revenue collections over time. With this in mind, the expenditure
associated with the refinement and construction of a coordinated statewide trauma system is a wise investment of taxpayer funds. A more meticulous analysis of statewide trauma costs is necessary to determine exact figures for implementation and maintenance of a well-coordinated trauma system. We hope these speculations will engender a more compulsive inquiry into appropriate decisions to maximize personal health and productivity and diminish health care expenses.

References
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