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# Estimated Minimum Savings to the Medicaid Budget in Arkansas by Implementing a Primary Seat Belt Law

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16. Abstract

A 2003 study estimated that if all States had primary laws from 1995 to 2002, over 12,000 lives would have been saved. Failure to implement a primary belt law creates a real cost to a State's budget for Medicaid and other State medical expenditures. This study estimates the minimum dollars Arkansas can expect to save on direct medical costs (primarily paid through Medicaid) by the implementation of a primary seat belt law. The current study analyzed Arkansas's 2005 Hospital Discharge Data, including only cases where the external cause of injury was a motor vehicle crash. The total estimated cost paid by Medicaid from motor vehicle crashes is $36 million for the first year and $6.7 million for each year thereafter.

In 2005, Arkansas's seat belt use rate was 68.3 percent. Based on this conversion rate one would expect belt use to increase by 12.68 percent and of those newly belted individuals, at least 50 percent would avoid injury. In 2005, The Federal Government reimbursed Arkansas at 73.37 percent. Accounting for this reimbursement, the first year savings to the State by implementation of a primary seat belt law would be about $0.6 million. Arkansas could expect to have saved $4.2 million in the first 5 years and $11.1 million over 10 years.

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## INTRODUCTION

> On Monday January 3, 2005, at 12:15 p.m., a 41-year-old woman was driving unbelted on State Route 38 in Lonoke County, Arkansas. She crashed into a vehicle driven by a 26-year-old man who was belted. The 41-year-old woman was ejected from the vehicle and died; the young man wearing his seat belt survived with no visible injuries.
>
> On Thursday May 26, 2005, at 4 p.m., a 17-year-old male was driving on SR-31 in White County, Arkansas, when he was involved in a collision. The other vehicle was driven by an 80-year-old man. The 80-year-old man and his 81-year-old female passenger, belted, both survived. The young man, not wearing a seat belt, died.
>
> On Friday June 17, 2005, at 6:54 p.m., two vehicles were involved in a crash on US-67 in Searcy, Arkansas. The driver of one vehicle, an unbelted 48-year-old male, was killed. The other vehicle's driver, a 45-year-old female wearing her seat belt, survived.
>
> On Tuesday September 13, 2005, at 10:10 a.m., two vehicles were traveling on US-62 in Salem, Arkansas. The driver of the first vehicle, an 85-year-old man, unbelted, died. The 85-year-old female passenger, unbelted, was killed in the crash. The driver of the other vehicle, a 23-year-old properly restrained woman, survived.

Seat belts can reduce the risk of death for front seat occupants of passenger cars by 45 percent. Similarly, belt use reduces the risk of serious non-fatal injuries by 50 percent for front seat occupants of passenger cars. Belts are associated with a 60-percent decrease in risk of injury while in light trucks (e.g. SUVs, minivans, and pickup trucks) [1].

There are two types of belt laws. Primary or "standard enforcement" seat belt laws allow police officers to enforce a violation of a seat belt law after observing a belt use infraction by itself. That is, the police can treat a seat belt violation as they would any other violation. Secondary laws prevent police from enforcing the belt law unless it is observed in association with another violation. That is, if the belt violation is the only visible infraction, police are not allowed to enforce the law.

According to the National Highway Traffic Safety Administration, the passage of primary seat belt laws would likely induce 40 percent of current non-users to wear seat belts. One study by the National Safety Council estimated that had all States had primary laws from 1995 to 2002 more than 12,000 lives would have been saved [2].

Additionally, there is a real cost to the State's budget in terms of Medicaid and other State medical expenditures associated with failure to implement a primary seat belt law. Specifically, this study estimates the *minimum* dollars Arkansas can expect to save on direct medical costs (primarily paid through Medicaid) by the implementation of a primary seat belt law.

**METHODS**

Arkansas's 2005 Hospital Discharge Data were used for the analyses. Only cases where the external cause of injury was a motor vehicle crash were included. There were a total of 4,721 such patients discharged from Arkansas hospitals in 2005. The cost of these motor vehicle generated injuries was $154,484,056 in direct hospital costs alone. Of that, $23,771,950 was costs billed to the State of Arkansas as Medicaid and other sources paid directly by the State.

Of the 4,721 patients discharged, 846 injuries were classified as Traumatic Brain Injuries (TBI) and/or Spinal Cord Injuries (SCI). These particular injuries are likely to lead to long-term post-hospitalization medical costs. That is, the costs continue over an injured person's lifetime. These costs cannot be looked at over a single year but need to be accumulated annually to gain an understanding of their financial impact to the State. Injuries occurring this year will cost tax payers money next year on top of the injuries occurring next year. In three years time, the costs will be for both the prior two years' injuries plus that year's injuries.

Traumatic Brain Injury Cost Estimates
The long-term direct medical costs for various types of injuries differ greatly. None of our estimates include peripheral costs such as lost wages and productivity. Post hospitalization TBI costs per person are estimated at $40,000 (for rehab and other medical costs) during the first year (according to the Craig Hospital[3]). Additional year costs were estimated from the National Institute of Health values pertaining to traumatic brain injuries, lifetime costs for such injuries and average lifespan of people with TBI. The average direct medical cost (beyond the first year) was estimated to be $26,871 per person per year (in addition to initial direct hospital costs). Having a TBI lessens life expectancy by an average of seven years [4].

Spinal Cord Injury Cost Estimates
SCI costs were based on the University of Alabama's National Spinal Cord Injury Statistical Center report showing first year cost per injury severity and additional year costs per injury severity. These costs were matched, using ICD-9 codes, to the injured persons in the Arkansas Hospital Discharge Database to estimate the costs for spinal cord injured individuals (See Table 1 for post-discharge costs). Note that the costs indicated in table 1 are *per injury*. It is only in a minority of cases that life expectancy is less than 10 years for SCI survivors; in fact 85 percent of SCI patients who survive the first 24 hours are still alive 10 years later [5, 6].

Table 1: Average Yearly Expenses

| Injury Severity | First year | Each year thereafter |
|---|---|---|
| High Quadriplegia | $ 741,425 | $ 132,807 |
| Low Quadriplegia | $ 478,782 | $ 54,400 |
| Paraplegia | $ 270,913 | $ 27,568 |
| Incomplete motor function at any level | $ 218,504 | $ 15,313 |

Source: The National SCI Statistical Center [5]

Medicaid Estimates
Estimating the percentage of TBI and SCI patients who are likely to become Medicaid recipients is difficult. The Craig Hospital showed that the proportion of those with TBI on Medicaid doubles in the year following injury. For SCI, one estimate is that there is a 24-percent increase in Medicaid-covered patients from the time of injury to the time of release from the hospital.

That is, according to the Missouri Model Spinal Cord Injury Center[7], 25 percent of SCI patients were covered by Medicaid at the time of injury and this figure increased to 31 percent upon release from the acute care facility (for SCI, the average length of stay in the acute care unit is 18 days[5]). Furthermore, the Craig Hospital estimates that 25.4 percent of all SCI will become Medicaid patients. Specifically, this was the percentage of SCI persons on Medicaid five years after injury.

**RESULTS**

In 2005, 94 TBI patients on Medicaid were discharged from Arkansas hospitals. Five of these patients died from their injuries and only contributed to the acute hospital care costs. The hospital charges for TBI patients were $5,028,836. The remaining 89 TBI patients each generated an estimated $40,000 additional first-year health care costs. For each additional year post-injury, these TBI patients are expected to incur $26,871 each in medical costs. The cost to Medicaid for the first year is estimated at about $8.6 million with each additional year (assuming the percentage on Medicaid doubles as per the Craig Hospital) adding about $4.8 million (See Table 2).

There were 13 SCI patients on Medicaid discharged from Arkansas Hospitals in 2005. Their hospital charges were $1,369,495. In total there were 92 patients with SCI stemming from motor vehicle crashes (5 died). We estimated that, post-hospitalization, an additional 24 percent of these survivors would become Medicaid recipients, and that 25.4 percent would be on Medicaid in the years following. Thus, using estimated medical expenditures (see Table 1) the costs to Medicaid would be about $10.1 million in the first year and $2 million each year thereafter (see Table 2). One and a half percent of the additional year's cost (see Table 2) of SCI was subtracted for each subsequent year in order to account for the 85 percent survival rate after 10 years (assuming a linear change).

Additionally, there were $17.4 million in non-TBI/SCI injury costs billed directly to Medicaid or the State (See Table 2).

| Table 2. Estimated and Actual Costs to Medicaid from MV Injuries | | |
|---|---|---|
| | Year 1 | Each additional year |
| Traumatic Brain Injury | $8,588,836 | $4,783,038 |
| Spinal Cord Injury | $10,071,161 | $1,965,778 |
| Other | $17,373,620 | |
| Total | $36,033,616 | $6,748,816 |
| Saved By Primary Law | $608,371 | $113,943 |

The total first year cost to the State of Arkansas for motor vehicle crashes is therefore $36 million for the first year and $6.7 million for each year after. According to NHTSA, a primary law would likely convert 40 percent of the non-belt users to belt users. In 2005, Arkansas's seat belt use rate was 68.3 percent. Based on this conversion rate one would expect belt use to increase by 12.68 percent and of those newly belted individuals, at least 50 percent would avoid injury (based on seat belt effectiveness in reducing injury). However, the Federal Government reimburses States a portion of their Medicaid expenditures. The 2005 reimbursement rate for Arkansas was 73.37 percent. Accounting for this reimbursement, the first year savings to the
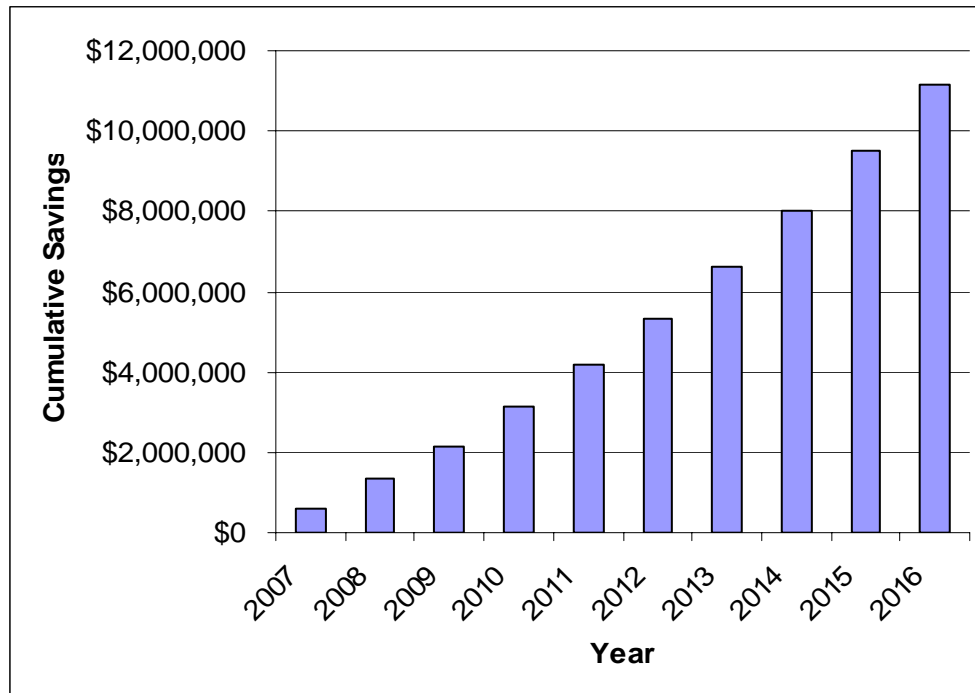
State by implementation of a primary seat belt law would be about $0.6 million. By the fifth year the savings would be $1.1 million for that year alone (see Table 3).

Table 3. Savings for each year by passing a primary law in 2007

| Year | Values | $ Saved |
|------|--------|---------|
| 2007 | Acute $ | $608,371 |
| 2008 | Acute $ + Prior 1 Years LT$ | $721,816 |
| 2009 | Acute $ + Prior 2 Years LT$ | $834,763 |
| 2010 | Acute $ + Prior 3 Years LT$ | $947,213 |
| 2011 | Acute $ + Prior 4 Years LT$ | $1,059,165 |
| 2012 | Acute $ + Prior 5 Years LT$ | $1,170,619 |
| 2013 | Acute $ + Prior 6 Years LT$ | $1,281,575 |
| 2014 | Acute $ + Prior 7 Years LT$ | $1,392,033 |
| 2015 | Acute $ + Prior 8 Years LT$ | $1,501,993 |
| 2016 | Acute $ + Prior 9 Years LT$ | $1,611,456 |

Considering the cumulative savings (adding up each year's savings), the State could expect to have saved $4.2 million in the first 5 years and $11.1 million over 10 years (See Figure 1).

Figure 1. Cumulative Minimum Savings by Implementation of Primary Law in 2007.



**CONCLUSION**

The estimates reported here are *minimum* savings associated with implementation of a primary seat belt law. In this study we do not explore the peripheral costs (loss of wages and tax revenues, productivity, loss of life, etc.). Additionally, research has show that the costs of unbelted injuries are 25 percent higher than belted injuries[8] and that unbelted occupants are more

likely to be Medicaid patients. Furthermore, the assumption here is that injuries other than TBI or SCI incur no cost beyond immediate direct hospital costs (i.e. possible follow-up treatments such as surgery or physical therapy are absent from our analyses). Accounting for these ancillary expenses would drastically raise the estimates presented here.

There is also no attempt to project cost increase over time. Medical cost increases have traditionally far outpaced inflation. Costs reported here is merely a small portion of the likely savings. Clearly the State can expect to reduce other associated costs by implementation of a primary law. For example, unemployment is much higher among disabled persons and family members frequently need to defer employment to become care takers. These costs not only reduce the tax base for the State but may also add to the number of persons on other State dependent monies (e.g., welfare). We also do not address the savings to private business and citizens of the State. Lastly, we do not attempt to place a price on human life, pain, and suffering.

All the costs in this study are based on the conservative values. The goal was to produce **an absolute minimum value.** Whenever multiple credible values existed for an estimate, we chose the lowest value.

It should be noted that some of the estimates in this report are different from those stated in previous reports (e.g. Chaudhary & Preusser, 2003). In those earlier documents, figures reported indicated *gross* costs to the State whereas the current document indicates *net* costs to the State. Implementation of a primary seat belt law would promote gross savings (i.e., not considering the Federal Reimbursement) of $2.3 million in the first year, $15.7 million by the fifth year, and $41.8 million over the next 10 years.

In sum, the State of Arkansas could expect to save at least $11.1 million dollars ($41.8 million gross) over the next 10 years on its annual budget in medical costs alone by implementing a primary seat belt law in 2007.

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# APPENDIX
## Calculations**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| 2007 | $36,033,616.17 | $6,719,329.71 | $6,689,843.04 | $6,660,356.36 | $6,630,869.69 | $6,601,383.01 | $6,571,896.33 | $6,542,409.66 | $6,512,922.98 | $6,483,436.31 |
| 2008 | | $36,033,616.17 | $6,719,329.71 | $6,689,843.04 | $6,660,356.36 | $6,630,869.69 | $6,601,383.01 | $6,571,896.33 | $6,542,409.66 | $6,512,922.98 |
| 2009 | | | $36,033,616.17 | $6,719,329.71 | $6,689,843.04 | $6,660,356.36 | $6,630,869.69 | $6,601,383.01 | $6,571,896.33 | $6,542,409.66 |
| 2010 | | | | $36,033,616.17 | $6,719,329.71 | $6,689,843.04 | $6,660,356.36 | $6,630,869.69 | $6,601,383.01 | $6,571,896.33 |
| 2011 | | | | | $36,033,616.17 | $6,719,329.71 | $6,689,843.04 | $6,660,356.36 | $6,630,869.69 | $6,601,383.01 |
| 2012 | | | | | | $36,033,616.17 | $6,719,329.71 | $6,689,843.04 | $6,660,356.36 | $6,630,869.69 |
| 2013 | | | | | | | $36,033,616.17 | $6,719,329.71 | $6,689,843.04 | $6,660,356.36 |
| 2014 | | | | | | | | $36,033,616.17 | $6,719,329.71 | $6,689,843.04 |
| 2014 | | | | | | | | | $36,033,616.17 | $6,719,329.71 |
| 2015 | | | | | | | | | | $36,033,616.17 |
| Total | $36,033,616.17 | $42,752,945.89 | $49,442,788.93 | $56,103,145.29 | $62,734,014.98 | $69,335,397.99 | $75,907,294.32 | $82,449,703.98 | $88,962,626.96 | $95,446,063.27 |
| Cumulative | $36,033,616.17 | $78,786,562.06 | $128,229,350.99 | $184,332,496.28 | $247,066,511.25 | $316,401,909.24 | $392,309,203.56 | $474,758,907.54 | $563,721,534.50 | $659,167,597.77 |
| Saved per year * | $608,370.68 | $721,815.94 | $834,763.37 | $947,212.97 | $1,059,164.72 | $1,170,618.65 | $1,281,574.73 | $1,392,032.98 | $1,501,993.40 | $1,611,455.97 |
| Saved Cumulative | $608,370.68 | $1,330,186.62 | $2,164,949.99 | $3,112,162.95 | $4,171,327.68 | $5,341,946.32 | $6,623,521.05 | $8,015,554.03 | $9,517,547.43 | $11,129,003.40 |

U = Expected change in unbelted pop. By implementing primary law: 40%

O = Statewide observed belt use (S. 157): 68.3%

C = Expected percent change in population: (U *(1-O))

E = Effectiveness of seat belts to reduce injury: 50%

* = Total * E*C

** Discount rates of .03 and .07 would reduce the 10-year estimate to $9.4 million and $7.6 million respectively.

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