U.S. Department
of Transportation
National Highway
Traffic Safety
Administration

DOT HS 807 589
Supplement to Final Report

February 1990

Exploration of Impact Measures of Safety Belt Use Laws
Volume II: Literature Reviewed, Expert Team Comments on Indicators, and Indicator Catalog

The United States Government does not endorse products or manufactures. Trade or manufacturer's names appear only because they are considered essential to the object of this report.

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT HS 807 589		

4. Title and Subtitle

EXPLORATION OF IMPACT MEASURES OF SAFETY BELT USE LAWS. VOLUME II: LITERATURE REVIEWED, EXPERT TEAM COMMENTS ON INDICATORS, AND INDICATOR CATALOG

5. Report Date
February 1990

6. Performing Organization Code

7. Author(s) Thomas W. Planek, Alan F. Hoskin, Kevin T. Fearn, Terrence A. Miller, Kathryn E. H. Race, George S. Benjamin

8. Performing Organization Report No.

9. Performing Organization Name and Address

National Safety Council
444 North Michigan Avenue
Chicago, Illinois 60611

10. Work Unit No. (TRAIS)

11. Contract or Grant No.
DTNH22-88-Z-07391

12. Sponsoring Agency Name and Address

U. S. Department of Transportation
National Highway Traffic Safety Administration
Office of Driver and Pedestrian Research (NRD-41)
Washington, DC 20590

13. Type of Report and Period Covered
Supplement to Final Report

14. Sponsoring Agency Code

15. Supplementary Notes

Volume I of this report contains specific and final project findings and recommendations. Volume II contains the detailed information on which these findings were based.

16. Abstract

This project identified, evaluated, and recommended indicators of safety belt use law (SBUL) impact (other than fatality reduction and observed belt usage) as well as institutional sources that collect them. The project involved an extensive literature review, an expert team, and a National Safety Council sponsored survey of data sources.

Four indicators out of 52 candidates were judged to have the highest potential for assessing SBUL impacts: (1) the "KABC" injury scale used on police accident reports, (2) the Abbreviated Injury Scale used on medical records, and its derivative Injury Severity Score, (3) occupant ejections from vehicles, and (4) head and face injuries including cranium, brain, and concussive injuries but excluding ear and eye injuries.

Two data sources out of 160 surveyed satisfied most of the 13 evaluation criteria. The Major Trauma Outcome Study appears useful for a multi-state, before-and-after study of SBUL impact. The National Electronic Injury Surveillance System could be adapted to gather national data to monitor future impacts of belt law revisions and other programmatic measures. The most promising long-term, state-level evaluation approach involves modifications of several data systems to link crash data in police accident reports with injury data in hospital medical records and trauma registries.

Valid and reliable SBUL impact indicators are not immediately available from many existing sources and it is unlikely that they can be generated quickly. It is recommended that coordination and integration of data-gathering efforts at the national level should be given first priority.

This volume of the final report contains (1) an annotated bibliography of the literature reviewed for the project, (2) expert team comments on the potential indicators, and (3) a catalog of profiles of all potential indicators considered.

17. Key Words		18. Distribution Statement
safety belts	AIS	Document is available to the U. S. public through the sponsoring agency (box 12) or NHTSA's Technical Reference Division.
safety belt use laws	KABC	
traffic laws	head injuries	
evaluation	ejection	
impact assessment	trauma registries	
	trauma	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified		

Form DOT F 1700.7 (8-72) Reproduction of form and completed page is authorized

Preface

This volume of "Exploration of Impact Measures of Safety Belt Use Laws" consists of supplemental material that was too bulky to include with the final project report in Volume I.

Part A is an annotated bibliography of all the literature reviewed. It is listed in alphabetical order by the authors' last names.

Part B is a summary of all of the comments made by the expert team on a list of candidate indicators sent to them early in the project. A summary of the expert team ratings of each indicator may be found in Volume I, Appendix D, and descriptions of the indicators may be found in Part C of this volume.

Part C is a catalog of candidate indicators considered for this project. Each candidate was rated by the project team on the profile features defined in Volume I, Appendix C. A ranked listing and summary of ratings by both the project team and the expert team may be found in Volume I, Appendix E.

Table of Contents

List of Abbreviations

AIS	Abbreviated Injury Scale
EMS	emergency medical services
ER	emergency room
E-code	external cause of injury (part of the ICD)
ICD	International Classification of Diseases, a manual used to classify diseases, injuries and causes of death.
ISS	Injury Severity Score
KABC	an injury code used for police accident reports: K-killed, A-incapacitating injury, B-nonincapacitating evident injury, C-possible injury
MAIS	maximum AIS severity score
MV	motor vehicle
MVA	motor-vehicle accident
NHTSA	National Highway Traffic Safety Administration

PART A

LITERATURE REVIEWED

[Documents are in alphabetical order by authors' names.]

document number	95	accession number	S-87-0523
reviewer	Benjamin	abstract only?	no

author	Agran, P.F. Dunkle, D.E. Winn, D.G.	year volume number pages month or issue	1987 27 1 58-64
title	Injuries to a sample of seatbelted children evaluated and treated in a hospital emergency room		
source	Journal of Trauma		
publication place			

indicator desc.	AIS, body part distribution Head, spine, extremity, chest/abdomen children 9-hospital system
what was counted	persons injured, injuries
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	hospital records, ER records
body part(s) studied	head, spine, thoax, abdomen/pelvic contents, extremities/pelvis
severity coding	AIS, MAIS
miscellaneous related variables	crash configuration, belt use, vehicle parts, seating position, age
sbul link?	no
results desc.	tabulations of severity and body part for selected seat belt users, subdivided by age group 10-14 similar to adults seat belt use self-reported

source institution	9 hospital E.R.s and coroner's office in a California County

document number	99	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Allen, M.J. Barnes, M.R. Bodiwala, G.G.	year volume number pages month or issue	1985 16 7 471-476 July
title	The effect of seat belt legislation on injuries sustained by car occupants		
source	Injury		
publication place			

indicator desc.	injury patterns, 402 cases reviewed patterns of driver and front seat passengers pre- and post- measure of severity and site and type distributions of injuries sustained by belted and nonbelted drivers and passengers
what was counted	injuries
how it was reported	
how it was used	SBUL evaluation
source records	
body part(s) studied	
severity coding	
miscellaneous related variables	belt use, seating position
sbul link?	yes
results desc.	comparison of two groups 4 months before and after passsage of law

source institution

document number	83	accession number	S-79-0520
reviewer	Benjamin	abstract only?	no

author	Andreasson, R. Roos, K.	year volume number pages month or issue	1977
title	Effects of Sweden's belt use law		
source	Proceedings of the 6th International Conference of the International Association of Accidents and Traffic Medicine		
publication place			

indicator desc.	body part: skull (-), face (-), chest (+), spine (+) percent of total injury ascribed to body part
what was counted	ER visits
how it was reported	% distribution
how it was used	safety belt effectiveness eval.
source records	EMS records
body part(s) studied	head, cranium, face, neck/throat, throat, spine, thorax, abdomen/pelvic, extremities/pelvis, upper extremities, lower extremities
severity coding	
miscellaneous related variables	belt use
sbul link?	yes
results desc.	tabulation of seat belt use vs. non-seat belt use

source institution	16 collaborating hospitals in Sweden (listed)

document number	54	accession number	S-88-1091
reviewer	Landes	abstract only?	no

author	Arajarui, E.	year	1988
		volume	20
		number	4
		pages	251-259
		month or issue	August

title: A retrospective analysis of chest injuries in 280 seat belt wearers

source: Accident Analysis and Prevention

publication place:

---

indicator desc.: examined chest injury fatalities of seat belt wearers in Finland between 1972 and 1985.

ribs/sternum/pelvis
chest wall

what was counted: Injuries, accidents

how it was reported: % distribution

how it was used: safety belt effectiveness eval.

source records: accident records

body part(s) studied: thorax

severity coding: AIS

miscellaneous related variables: crash configuration, vehicle parts, belt-induced injury

sbul link? no

results desc.: first listed chest injury patterns for fatally and severly injured seat belt wearers. Then looked at other related factors.

chest injury mortality (-)
seat belts less effective in lateral collisions

---

source institution: Boards of Traffic Accident Investigation of the Insurance Companies (Finland)

document number	59	accession number	S-87-0682
reviewer	Fearn	abstract only?	no

author	Arajarvi, E. Santavirta, S. Tolonen, J.	year	1987
		volume	27
		number	4
		pages	393-397
		month or issue	April
title	Abdominal injuries sustained in severe traffic accidents by seatbelt wearers		
source	Journal of Trauma		
publication place			

indicator desc.	injury caused by belts in various crash scenarios abdomen/pelvic contents
what was counted	accidents, injuries
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	accident records, hospital records
body part(s) studied	head, brain, spine, cervical, thoracic, lumbar, thorax, heart/lung, chest wall, ribs, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities
severity coding	
miscellaneous related variables	crash configuration, seating position, belt-induced injury, vehicle parts, injury type, accident type, belt use
sbul link?	no
results desc.	analysis of severe traffic accidents over an 11-year period in Finland to assess the role of seatbelt wearing on the injury profile decrease in fatalities and severe injuries

source institution	University Central Hospital, Helsinki, Finland

document number	82	accession number	S-86-0184
reviewer	Benjamin	abstract only?	no

author	Backaitis, S.H. Dalmotas, D.	year volume number pages month or issue	1985

title	Injury patterns and injury sources of unrestrained an three point belt restrained car occupants in injury producing frontal collisions
source	29th Annual Proceedings of the American Association for Automotive Medicine, Oct. 1985, Washington, DC
publication place	

indicator desc.	AIS > or = 2, body segment injuries head (-), face (-), chest(+), abdomen (+)
what was counted	injuries
how it was reported	% distribution, rates
how it was used	safety belt effectiveness eval.
source records	accident records
body part(s) studied	head, face, neck/throat, neck, thorax, chest wall, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities, pelvis
severity coding	AIS
miscellaneous related variables	crash configuration, seating position, vehicle parts
sbul link?	no
results desc.	injury index ratio of injuries to given part to all injuries at same severity level

source institution	Canadian Restrained Occupant Injury File 1983 NASS

document number	102	accession number	S-77-0426
reviewer	Race	abstract only?	no

author	Baird, J. Sublett, F. Hughes, R. Didion, J. Stoddard, J. Wheatley, D. et. al.	year volume number pages month or issue	1977
title	Restraint systems evaluation program		
source	National Highway Traffic Safety Administration		
publication place			

indicator desc.	injury patterns police, hospital, AIS data
what was counted	persons injured
how it was reported	
how it was used	other evaluation, air bag
source records	special accident investigations
body part(s) studied	head, face, neck/throat, neck, spine, thoracic, lumbar, thorax, chest wall, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities, pelvis
severity coding	AIS, OIC
miscellaneous related variables	type of vehicle, ejection, belt use, crash configuration, seating position, age, sex, alcohol
sbul link?	no
results desc.	to evaluate accident data may be outdated given age of study

source institution	Institute of Safety and System Management University of Southern California

document number	105	accession number	S-82-0131
reviewer	Landes	abstract only?	no

author	Beier, G. Schuller, E. Spann, W.	year	1981
		volume	
		number	
		pages	
		month or issue	

title: Risk and effectiveness of seat belts in Munich area automobile accidents

source: Proceedings of the 25th STAPP Car Crash Conference, Sept. 1981, San Francisco, Society of Automotive Engineers

publication place:

indicator desc.	belt effectiveness measured as the severity of actually sustained injuries comapred to expected injuries without belts
what was counted	injuries
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	accident records
body part(s) studied	
severity coding	AIS
miscellaneous related variables	crash configuration, belt use
sbul link?	no
results desc.	using the effectiveness measure, different directions of impact were examined seat belts reduced number of non-minor, non-fatal injured occupants. Injury severity also reduced.

source institution

document number	113	accession number	?-79-2632
reviewer	Benjamin	abstract only?	no

author	Bohlin, N.	year	1977
		volume	
		number	
		pages	
		month or issue	
title	Fifteen years with 3 point safety belts		
source	Proceedings of the 6th International Conference of the International Association of Accident and Traffic Medicine		
publication place			

indicator desc.	AIS 3-6 (p.147)
what was counted	injuries
how it was reported	number
how it was used	safety belt effectiveness eval.
source records	corporate records
body part(s) studied	
severity coding	AIS
miscellaneous related variables	crash configuration, belt use
sbul link?	no
results desc.	tabulated frequency

source institution Volvo Company, Sweden

document number	122	accession number	ILL
reviewer	Miller	abstract only?	no

author	Bohlin, N.I.	year	1979
		volume	
		number	
		pages	
		month or issue	

title: Twenty years of safety belt experience and the effect of safety belt legislation in Sweden

source: 1979 International Symposium on Seat Belts in Tokyo

publication place:

indicator desc.:

what was counted: injuries

how it was reported: % distribution

how it was used: safety belt effectiveness eval., SBUL evaluation

source records: corporate records, accident records

body part(s) studied: thorax, head

severity coding: AIS

miscellaneous related variables: belt use

sbul link?: yes

results desc.: injury reducing effect-- average 24 % (AIS 1-2), 68% (AIS 3-6)

source institution:

document number	33	accession number	C-77-1947
reviewer	Benjamin	abstract only?	no

author	Briner, A.M.	year	1976
		volume	1
		number	
		pages	912-914
		month or issue	June
title	Penetrating eye injuries associated with motor vehicle accidents		
source	Medical Journal of Australia		
publication place			

indicator desc.	penetrating eye injuries full thickness global laceration eye injuries (incidence/nature) (-) partial or permanent loss of visual acuity (-)
what was counted	injuries
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	hospital records, ER records, inpatient records
body part(s) studied	face, eye
severity coding	
miscellaneous related variables	belt use
sbul link?	yes
results desc.	Tabulates each case as to use of restraint. Only 3 out of 24 used restraints and 2 incomplete. Annual decline in penetrating eye injuries despite increase in driver registrations. 24 cases in 2.5 year period. 17 cases/year before seat belt legislation 9.6 cases/year after

source institution	Princess Alexandra Hospital, Brisbane, Australia

document number	58	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Budd, J.S.	year	1985
		volume	291
		number	6498
		pages	785
		month or issue	Sept. 21

title: Effect of seat belt legislation on the incidence of sternal fractures seen in the accident department

source: British Medical Journal

publication place:

---

indicator desc.: citation only, need original

ribs/sternum/pelvis
bruised/fractured sternum

what was counted: ER visits

how it was reported:

how it was used: SBUL evaluation

source records:

body part(s) studied: sternum

severity coding:

miscellaneous related variables:

sbul link?: yes

results desc.:

---

source institution:

document number	88	accession number	S-79-0529
reviewer	Benjamin	abstract only?	no

author	Cameron, M.H. Nelson, P.G.	year volume number pages month or issue	1977
title	Injury patterns with and without seat belts		
source	Proceedings of the 6th International Conference of the International Association of Accidents and Traffic Medicine		
publication place			

indicator desc.	AIS, injury to body parts types of injury in fatalities: fracture of vault of skull, brain damage, aorta damage. types of injuries in survivors: concussion (-), pneumothorax (-), whiplash (+), transient Cx cord damage (+), kidney (-)
what was counted	persons injured, injuries
how it was reported	% distribution
how it was used	safety belt effectiveness eval.
source records	hospital records, coroner's records
body part(s) studied	head, spine, thorax, abdomen/pelvic contents, extremities/pelvis
severity coding	
miscellaneous related variables	crash configuration, ejection, belt use, seating position
sbul link?	no
results desc.	distribution of injury types as percentage of total seat belt vs. nonseat belt. Further breakown by type of belt, location 6,526 cases, very comprehensive article. Some indicators dependent on type of impact and age. more fatality indicators, Table III, p.452

source institution	Royal Autralasian College of Surgeons Pattern of Injury Survey Victorian road casualties taken from all hospitals in Victoria, post mortem reports, and ambulance reports

document number	126	accession number	ILL
reviewer	Miller	abstract only?	no

author	Campbell, B.J.	year	1979
		volume	
		number	
		pages	
		month or issue	
title	Seat belt effectiveness		
source	1979 International Symposium on Seat Belts in Tokyo		
publication place			

indicator desc.	
what was counted	injuries
how it was reported	number
how it was used	safety belt effectiveness eval.
source records	accident records
body part(s) studied	
severity coding	
miscellaneous related variables	belt use
sbul link?	no
results desc.	65 % reduction in serious and fatal injuries for belt wearers compared to expected based on experience of nonbelt wearers

source institution

document number	18	accession number	Gurin
reviewer	Miller	abstract only?	no

author	Campbell, B.J. Campbell, F.A.	year volume number pages month or issue	
title	Casualty reduction and belt use associated with occupant restraint laws		
source	University of North Carolina Highway Safety Research Center		
publication place	Chapel Hill, North Carolina		

indicator desc.	number of injuries in certain states before and after law N.C. injuries broken down by severity (some other states also). number of injuries provided from state records effects of SBULs in Illinois, Michigan, N.Carolina, Texas, New York
what was counted	injuries
how it was reported	number
how it was used	SBUL evaluation
source records	accident records
body part(s) studied	
severity coding	
miscellaneous related variables	seating position, belt use
sbul link?	yes
results desc.	time series used. positive effect., in at least one state Tex., N.Y., N.C., Mich., Ill.: number of injuries/moderate, serious or all (-) estimated 10 % improvement overall in injury due to SBULs

source institution	traffic data sources in Illinois, Michigan, N. Carolina, Texas, and New York

document number	77	accession number	C-87-1743
reviewer	Fearn	abstract only?	no

author	Campbell, B.J. Campbell, F.A.	year	1986
		volume	
		number	
		pages	
		month or issue	

title	Seat belt laws in four foreign countries compared to the United States
source	AAA Foundation for Public Safety
publication place	Falls Church, Virginia

indicator desc.	expected vs. actual number of moderate to fatal injuries in North Carolina
	effectiveness evaluation
what was counted	persons involved, injuries
how it was reported	number
how it was used	safety belt effectiveness eval., SBUL evaluation
source records	accident records
body part(s) studied	
severity coding	
miscellaneous related variables	
sbul link?	yes
results desc.	to assess the effectiveness of the North Carolina belt law
	decrease in observed post belt law injuries and fatalities compared to predicted

source institution	University of North Carolina

document number	110	accession number	S-87-0401
reviewer	Benjamin	abstract only?	no

author	Campbell, B.J. Campbell, F.A.	year volume number pages month or issue	1986
title	Early results of seat belt legislation in the United States of America		
source	Proceedings of the IRCOBI Conference, 1986		
publication place			

indicator desc.	injury severity, no injury, minor, moderate, serious, fatal police officer rating, guidelines not defined
what was counted	persons involved, accidents
how it was reported	% distribution, number
how it was used	SBUL evaluation
source records	accident records
body part(s) studied	
severity coding	KABC
miscellaneous related variables	type of vehicle
sbul link?	yes
results desc.	tabulates moderate and severe injuries before and after law 12-15 % drop

source institution	State of North Carolina Police Crash Reports Highway Safety Research Center University of North Carolina

document number	74	accession number	C-84-2825
reviewer	Benjamin	abstract only?	no

author	Carlsson, G.
year	1983
volume	4
number	2
pages	122-125
month or issue	
title	Ejection--a hazard in traffic accidents
source	International Journal of Vehicle Design
publication place	

indicator desc.	removed from interior of car, may be partially through open door EMS reports ejections
what was counted	injury episodes
how it was reported	% distribution
how it was used	safety belt effectiveness eval.
source records	corporate records
body part(s) studied	
severity coding	
miscellaneous related variables	crash configuration, seating position, ejection, belt use
sbul link?	no
results desc.	tabulation by type of impact. Only 2 belt users in 90 cases

source institution

document number	44	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Carter, R.E.	year	1977
		volume	70
		number	6
		pages	709-710
		month or issue	June
title	Traumatic spinal cord injuries due to automobile accidents		
source	Southern Medical Journal		
publication place			

indicator desc.	spinal cord injuries lead to rehabilitation spine injuries rehabilitation
what was counted	persons injured
how it was reported	% distribution, number
how it was used	case reports
source records	hospital records, inpatient records
body part(s) studied	spine
severity coding	
miscellaneous related variables	crash configuration, belt use, seating position
sbul link?	no
results desc.	389 cases from motor vehicle accidents. 90 % had no seat belt don't know use in general population

source institution	Texas Institute for Rehabilitation and Research

document number	64	accession number	Gurin
reviewer	Race	abstract only?	no

author	Champion, H.R. Copes, W.S. Craig, M. Morelli, S. Keast, S. Bain, L.	year volume number pages month or issue	1986
title	Preliminary study of head and neck trauma of automobile crashes and their consequences		
source	National Highway Traffic Safety Administration		
publication place			

indicator desc.	carefully matched meeical and biomechanical data health care
what was counted	injuries
how it was reported	
how it was used	epidemiological studies
source records	hospital records, accident records, special crash investigations
body part(s) studied	head, brain, face, neck/throat,
severity coding	AIS
miscellaneous related variables	
sbul link?	no
results desc.	101 injury cases. Outcome norms: determine whether number of survivors is greater, less than or about the same as expected.

source institution	Research Foundation of the Washington Health Care Corp. Washington Hospital Center Corporation 110 Irving Street, N.W. Washington, DC 20010
	Note: American College of Surgeons Committee on Trauma, 89 hospitals, submit detailed injury data, 35,000 cases

document number	53	accession number	S-88-1376
reviewer	Fearn	abstract only?	no

author	Chetcuti, P. Levene, M.I.	year	1987
		volume	15
		number	
		pages	207-209
		month or issue	
title	Seat belts: a potential hazard to the fetus		
source	Journal of Perinatal Medicine		
publication place			

indicator desc.	separation of the placenta from the uterine wall due to impact with lap belt abdominal injuries
what was counted	
how it was reported	
how it was used	*case reports*
source records	hospital records, ER records
body part(s) studied	abdomen/pelvic contents
severity coding	
miscellaneous related variables	belt-induced injury, seating position, belt use
sbul link?	no
results desc.	seat belt use, even in low speed collisions, warrants rapid assess in the case of the pregnant occupant to allow for possible resuscitation of the fetus increase in injuries to the abdomen/pelvic contents of pregnant occupants

source institution	Neonatal Unit, Department of Child Health, Leicester University School of Medicine, Leicester, United Kingdom

document number	80	accession number	NSC
reviewer	Benjamin	abstract only?	no

author	Chorba, T.L. Reinfurt, D. Hulka, B.	year	1988
		volume	260
		number	24
		pages	3593-3597
		month or issue	Dec.23/30
title	Efficacy of mandatory seat-belt use legislation: the North Carolina experience from 1983 through 1987		
source	Journal of the American Medical Association		
publication place			

indicator desc.	uses police report to classify none, mild, moderate, severe
what was counted	persons injured
how it was reported	% distribution
how it was used	SBUL evaluation
source records	accident records
body part(s) studied	
severity coding	
miscellaneous related variables	crash configuration, seating position, belt use
sbul link?	yes
results desc.	tabulates rate of injury class on percentage of total accidents significant reductions in severe and fatal injuries among front-seat car occupants. HSRC data

source institution	School of Public Health University of North Carolina

document number	119	accession number	ILL
reviewer	Miller	abstract only?	no

author	Christian, M.S.	year	1984
		volume	289
		number	
		pages	1525-1526
		month or issue	Dec. 1
title	Morbidity and mortality of car occupants: comparative survey over 24 months		
source	British Medical Journal		
publication place			

indicator desc.	
what was counted	hospital admissions, hospital stays, injuries
how it was reported	scores
how it was used	SBUL evaluation
source records	hospital records
body part(s) studied	
severity coding	ISS
miscellaneous related variables	seating position, ejection, alcohol
sbul link?	yes
results desc.	mean injury severity score reduced from 4.104 for 12 months before UK SBUL to 2.17 for 12 months after

source institution

document number	34	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Cole, M.D. Clearkin, L. Dabbs, T. Smerdon, D.	year volume number pages month or issue	1987 71 6 436-440 June
title	The seat belt law and after		
source	British Journal of Ophthalmology		
publication place			

indicator desc.	perforating eye injuries (incidence/nature) (-)
what was counted	injuries
how it was reported	number
how it was used	safety belt effectiveness eval.
source records	hospital records, ER records, inpatient records
body part(s) studied	face, eye
severity coding	
miscellaneous related variables	belt use
sbul link?	yes
results desc.	378 serious eye injuries. Asserted that seat belt legislation reduces serious eye injuries

source institution

document number	45	accession number	Gurin
reviewer	Race	abstract only?	no

author	Colorado Department of Health	year	1987
		volume	
		number	
		pages	
		month or issue	
title	Annual report of the spinal cord injury Early Notification System (ENS)		
source	Colorado Department of Health		
publication place	Denver, Colorado		

indicator desc.	hospitalization cost, causes/levels spine injuries
what was counted	persons injured, injuries, costs
how it was reported	
how it was used	epidemiological studies, demographics
source records	hospital records
body part(s) studied	spine
severity coding	ICD, (9CM), E-codes
miscellaneous related variables	
sbul link?	no
results desc.	76 mv cases. Hospitalized over 6500 days. $6.5 million spent for 1987 Colorado spinal spinal cord injury survivors. ages 16-45, comprehensive surveillance program funded by a grant from National Institute of Disability and Rehabilitation Research (reported as collecting data)

source institution	Spinal Cord Injury Early Notification System (ENS) Division of Prevention Programs, Colorado Department of Health 4210 East 11th Avenue, Denver, Colorado 80220 (303) 331-8344 collaboration of Colorado Department of Health, Wyoming Hospital Association, 42 Colo./Wyo. hospitals

document number	14	accession number	S-75-1037
reviewer	Miller	abstract only?	no

author	Commonwealth Bureau of Census and Statistics, Victoria Office	year	1973
		volume	
		number	
		pages	
		month or issue	

title: Report on a statistical investigation into the effectiveness of seatbelts in motor-vehicle accidents

source: Commonwealth Bureau of Census and Statistics, Victoria Office

publication place:

indicator desc.: ratio of injured to noninjured drivers for seat belts vs. nonseat belt wearers; number of injuries before and after the law in Australia

what was counted: injuries

how it was reported: number

how it was used: safety belt effectiveness eval., SBUL evaluation

source records: accident records

body part(s) studied:

severity coding:

miscellaneous related variables:

sbul link?: yes

results desc.: number of injuries was compard to expected values using time series; data from Australian state of Victoria

serious injuryies (-), number of injuries (-)

source institution: Commonwealth Bureau of Census and Statistics

document number	61	accession number	B-81-0025
reviewer	Landes	abstract only?	no

author	Dagnone, L.E. Siu, T.O.	year volume number pages month or issue	1981
title	The effect of seat belt use on the demand for medical services		
source	Proceedings of the International Symposium on Occupant Restraints, Toronto, Ontario, Canada, June, 1981, A.A.A.M.		
publication place	Morton Grove, Illinois		

indicator desc.	includes counts of initial ambulance runs, physician assessment, required ER services and neurosurgical consultations trauma/ER
what was counted	ambulance runs, ER visits, hospital stays, hospital admissions, medical procedures, doctor visits, clinic visits, disability days
how it was reported	number, rates
how it was used	safety belt effectiveness eval.
source records	hospital records, EMS records
body part(s) studied	
severity coding	disability days
miscellaneous related variables	disability days
sbul link?	yes
results desc.	The demand for medical services was measured before and after belt use laws in Ontario (1975/1976) ambulance runs (-), physician assessment (-), ambulance transfers(-), hospital admissions(-), inpatient medical services (-), neurosurgical consultations and surgical operations (-), outpatient services (-), lost time or disability time (+/-)

source institution

document number	106	accession number	S-80-0840
reviewer	Landes	abstract only?	no

author	Dalmotas, D.J.	year	1980
		volume	
		number	
		pages	
		month or issue	

title: Mechanisms of injury to vehicle occupants restrained by three-point seat belts

source: Proceedings of the 24th STAPP Car Crash Conference, Oct. 1980, Troy, Mich., Society of Automotive Engineers

publication place:

indicator desc.	general injuries, injuries of all body regions to front seat belted occupants (all collision types)
what was counted	accidents, injuries
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	accident records, hospital records
body part(s) studied	head, neck, face, spine, thorax, chest wall, abdomen, extremities/pelvis, upper extremities, lower extremities, pelvis
severity coding	AIS
miscellaneous related variables	crash configuration, vehicle parts, seating position, type of vehicle
sbul link?	no
results desc.	a large number of variables were examined including nature of impact, body region, AIS severity, type of injury 3-point belts afford front seat occupants excellent protection against fatal or life threatening injuries

source institution: Dainius J. Dalmotas
Vehicle Systems Division
Road and Motor Vehicle Traffic Safety Branch
Transport Canada

document number	115	accession number	S-87-0770
reviewer	Fearn	abstract only?	no

author	Deans, G.T. Magalliard, J.N. Kerr, M. Rutherford, W.H.	year volume number pages month or issue	1987 18 1 10-12 January
title	Neck sprains--a major cause of disability following car accidents		
source	Injury		
publication place			

indicator desc.	neck sprains, pain in the neck area following a motor vehicle accident noncontact soft tissue neck injuries neck injuries (incidence/nature)
what was counted	injuries
how it was reported	% distribution, number
how it was used	other evaluation
source records	hospital records
body part(s) studied	neck/throat, neck
severity coding	
miscellaneous related variables	crash configuration, belt use, seating position
sbul link?	no
results desc.	explored the time course of onset of neck pain, many times unreported at hospital due to late onset, many more sprains were found to occur among belted occupants neck (+) patients wearing belts experienced neck pain more frequently than unbelted patients

source institution	Royal Victoria Hospital, Belfast, Northern Ireland

document number	39	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Deans, G.T. McGalliard, J.N. Rutherford, W.H.	year volume number pages month or issue	1986 292 6513 94-95 Jan. 11
title	*Incidence and duration of neck pain among patients injured in car accidents*		
source	British Medical Journal		
publication place			

indicator desc.	abstract-get original neck injuries
what was counted	
how it was reported	
how it was used	
source records	
body part(s) studied	
severity coding	
miscellaneous related variables	
sbul link?	
results desc.	

source institution

document number	50	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Denis, R. Allard, M. Atlas, H. Farkouh, E.	year volume number pages month or issue	1983 23 11 1007-1008 November
title	Changing trends with abdominal injury in seatbelt wearers		
source	Journal of Trauma		
publication place			

indicator desc.	gastrointestinal injury(+) surgical diagnosis abdominal injuries
what was counted	persons injured
how it was reported	number
how it was used	case reports
source records	hospital records, inpatient records
body part(s) studied	abdomen/pelvic contents
severity coding	
miscellaneous related variables	belt use
sbul link?	no
results desc.	case reports. 32 patients. 27 of 32 using 3 point belts

source institution l'Hopital du Sacre-Coeur

document number	24	accession number	C-76-2710
reviewer	Miller	abstract only?	no

author	Einar-Nilsson, L.	year	1976
		volume	
		number	
		pages	
		month or issue	
title	Restraint system effectiveness		
source	U.S. D.O.T. National Motor Vehicle Safety Advisory Council Motor Vehicle Safety Seminar		
publication place			

indicator desc.	number of injuries by AIS, frequency of injury for head, spinal, chest and others. experience of SAAB cars in Sweden following SBUL in Sweden.
what was counted	injuries
how it was reported	% distribution, number
how it was used	SBUL evaluation
source records	corporate records
body part(s) studied	head, face, spine, thorax
severity coding	AIS
miscellaneous related variables	belt-induced injury, vehicle parts, belt use
sbul link?	yes
results desc.	for many types of injuries, found that frequency was not reduced but severity was minor injuries (-), moderate injuries (-), severe injuries (-), number of injuries (-), head (-), spine (+), chest (+), face (-)

source institution	SAAB, Sweden

document number	118	accession number	ILL
reviewer	Miller	abstract only?	no

author	Epstein, H.C. Wiss, D.A. Cozen, L.	year	1985
		volume	
		number	201
		pages	9-17
		month or issue	December
title	Posterior fracture dislocation of the hip with fractures of the femoral head		
source	Clinical Orthopaedics and Related Research		
publication place			

indicator desc.	
what was counted	injuries
how it was reported	
how it was used	case reports
source records	hospital records
body part(s) studied	extremities/pelvis, pelvis
severity coding	
miscellaneous related variables	
sbul link?	no
results desc.	"First priority in prevention of traumatic discloaction of the hip is mandatory use of seat belts, because 80 % of these dislocations were the result of dashboard injuries."

source institution Univeristy of Southern California, Los Angeles

document number	56	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Evans, P.D. Mackie, I.G.	year	1985
		volume	16
		number	7
		pages	485-486
		month or issue	
title	Fracture of the body of the sternum associated with the use of static seat belts		
source	Injury		
publication place			

indicator desc.	4 case reports ribs/sternum/pelvis bruised/fractured sternum
what was counted	injuries
how it was reported	
how it was used	case reports
source records	hospital records
body part(s) studied	thorax, sternum
severity coding	
miscellaneous related variables	belt use
sbul link?	no
results desc.	case reports

source institution Cardiff Royal Infirmary

document number	16	accession number	S-85-0365
reviewer	Miller	abstract only?	no

author	Freedman, L.S.	year	1984
		volume	16
		number	1
		pages	60-62
		month or issue	November
title	Initial assessment of the effect of the compulsory use of seat belts on car occupants' injuries, and the Trauma Department work-load		
source	Injury		
publication place			

indicator desc.	number of injuries seen by ER before and after law, distribution by severity and part of body
what was counted	injuries
how it was reported	% distribution
how it was used	SBUL evaluation
source records	hospital records, ER records, inpatient records
body part(s) studied	head, face, neck/throat, neck, abdomen/pelvic contents, extremities/pelvis
severity coding	
miscellaneous related variables	seating position, belt use, age
sbul link?	yes
results desc.	before and after law; comparable 3 month periods in 1982-1983 from English hospital head (-), face (-), whiplash (+)

source institution	Royal Berkshire Hospital, Reading, England

document number	78	accession number	S-87-0155
reviewer	Benjamin	abstract only?	no

author	Friedel, B. Marburger, E.A.	year volume number pages month or issue	1986
title	Belt usage rates in the Federal Republic of Germany and their medical consequences		
source publication place	30th Annual Proceedings of the American Association for Automotive Medicine, Oct., 1986, Montreal, Quebec		

indicator desc.	AIS > 1
what was counted	hospital admissions, hospital stays, injuries, clinic visits
how it was reported	% distribution, number
how it was used	SBUL evaluation
source records	special studies
body part(s) studied	head, eye, face, neck/throat, neck, spine, thoracic, thorax, sternum, ribs, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities
severity coding	AIS
miscellaneous related variables	
sbul link?	yes
results desc.	overall injuries down (results also listed by body part). reduction in hospital admissions. eye injuries down.

source institution

document number	28	accession number	C-85-2056
reviewer	Landes	abstract only?	no

author	Gloyns, R.F. Rattenbury, S.J. Rivlin, A.Z. Hayes, H.R.M. Hanstead, J.K. Proctor, S.	year volume number pages month or issue	1981
title	Steering wheel induced head and facial injuries amongst drivers restrained by seat belts		
source	Proceedings of the 6th International IRCOBI Conference		
publication place			

indicator desc.	head (except face, eye), face (except eye)
what was counted	injury episodes, drivers involved
how it was reported	% distribution, number
how it was used	epidemiological studies, other evaluation
source records	accident records
body part(s) studied	head, face
severity coding	
miscellaneous related variables	injury type, vehicle parts
sbul link?	
results desc.	

source institution

document number	32	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Glynn, R.J. Seddon, J.M. Berlin, B.M.	year volume number pages month or issue	1988 106 6 785-789
title	The incidence of eye injuries in New England adults		
source	Arch. Opthalmol.		
publication place			

indicator desc.	Random population, telephone survey eye injuries (incidence/nature) (-)
what was counted	injuries
how it was reported	% distribution, rates
how it was used	epidemiological studies
source records	random telephone survey
body part(s) studied	face, eye
severity coding	
miscellaneous related variables	belt use
sbul link?	
results desc.	Rate up in non-seat belt users (self-reported). Not significant. Only 26 cases in whole sample. denominator of rate: population

source institution

document number	11	accession number	S-74-0238
reviewer	Miller	abstract only?	no

author	Griffin, L.	year	1973
		volume	
		number	
		pages	
		month or issue	

title	Analysis of the benefits derived from certain presently existing motor-vehicle safety devices: a review of the literature
source	University of North Carolina Highway Safety Research Center
publication place	Chapel Hill

indicator desc.	distribution of injuries for belted vs. unbelted by AIS level (driver and passenger) literature review, summary of other studies
what was counted	injuries
how it was reported	% distribution
how it was used	safety belt effectiveness eval.
source records	
body part(s) studied	
severity coding	AIS, KABC
miscellaneous related variables	belt-induced injury, belt use
sbul link?	no
results desc.	reported on Swedish data, Australian data, N.Carolina data

source institution	cited other data sources

document number	13	accession number	C-80-0374
reviewer	Miller	abstract only?	no

author	Grime, G.	year	1979
		volume	11
		number	
		pages	293-306
		month or issue	December

title	A review of research on the protection afforded to occupants of cars by seat belts which provide upper torso restraint
source	Accident Analysis and Prevention
publication place	

indicator desc.	head, neck, chest, spine, abdomen, etc. % injured summary of other research
what was counted	injuries
how it was reported	rates
how it was used	safety belt effectiveness eval., SBUL evaluation
source records	
body part(s) studied	head, neck/throat, neck, spine, thorax, abdomen/pelvic contents
severity coding	AIS
miscellaneous related variables	
sbul link?	no
results desc.	literature review and some discussion of Australian SBUL looked at fatalities and overall serious injuries estimated reduction of serious injuries with belt use (45 to 70 %) number of injuries from SBUL in Australia (-)

source institution

document number	97	accession number	C-78-1203
reviewer	Benjamin	abstract only?	no

author	Grime, G.	year	1975
		volume	
		number	
		pages	
		month or issue	

title	Head and neck injuries to car occupants wearing safety belts in frontal collisions
source	2nd International Conference of the International Research Committee on the Biokinetics of Impacts
publication place	

indicator desc.	severity (not AIS). Body part: head and face, neck, shoulder, chest and ribs, internal organs, arms, legs and knees, cuts and bruises body part class vs. minor, moderate severe seatbelt wearers only
what was counted	accidents, injuries
how it was reported	number
how it was used	other evaluation
source records	corporate records, seat belt wearer reports
body part(s) studied	head, neck/throat, neck, thorax, abdomen/pelvic contents, extremities/pelvis
severity coding	
miscellaneous related variables	crash configuration, belt-induced injury, belt use, speed
sbul link?	no
results desc.	tabulation of number of injuries by body part and severity and velocity of impact

source institution Traffic Studies Group, London

document number	38	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Guertler, A.T.	year	1988
		volume	17
		number	8
		pages	838-839
		month or issue	August
title	Blunt laryngeal trauma associated with shoulder harness use		
source	Ann. Emerg. Med.		
publication place			

indicator desc.	neck injuries laryngeal injury blunt laryngeal trauma, laceration from shoulder belt 1 case
what was counted	ER visits
how it was reported	
how it was used	case reports
source records	hospital records, ER records, inpatient records
body part(s) studied	neck/throat, throat
severity coding	
miscellaneous related variables	belt use
sbul link?	no
results desc.	case report

source institution Madigan Army Medical Center, Tacoma, Washington

document number	43	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Hadley, M.N. Sonntag, V.K.H. Grahm, T.W.	year volume number pages month or issue	1986 11 9 861-864
title	Axis fractures resulting from motor vehicle accidents. The need for occupant restraints		
source	Spine		
publication place			

indicator desc.	C2 fractures, persons thrown to back seat. 1 out of 30 had seat belt. Note: more than 30 cases. 78 vehicle cases but records incomplete spine injuries ejection
what was counted	persons injured
how it was reported	% distribution, number
how it was used	case reports
source records	hospital records, inpatient records
body part(s) studied	cervical, spine
severity coding	
miscellaneous related variables	ejection, belt use
sbul link?	no
results desc.	case reports with seat belt use, associated often with head injury. contradicts article on hangman's noose dramatically (Lesoin et al.)

source institution Barrow Neurological Institute, Phoenix, Arizona

document number	55	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Hamilton, J.R.L. Dearden, C. Rutherford, W.H.	year volume number pages month or issue	1984 16 3 155-156
title	Myocardial contusion associated with fracture of the sternum: important features of the seat belt syndrome		
source	Injury		
publication place			

indicator desc.	ribs/sternum/pelvis myocardial contusion bruised/fractured ribs
what was counted	injuries
how it was reported	
how it was used	case reports
source records	hospital records
body part(s) studied	thorax, heart/lung, sternum
severity coding	
miscellaneous related variables	belt use
sbul link?	no
results desc.	3 case reports

source institution

document number	41	accession number	S-86-1058
reviewer	Fearn	abstract only?	no

author	Hampson, S. Coombs, R. Hemingway, A.	year	1984
		volume	57
		number	
		pages	1033-1034
		month or issue	November
title	Fractures of the upper thoracic spine--an addition to the "seat-belt" syndrome		
source	British Journal of Radiology		
publication place			

indicator desc.	Spinal cord prone to injuries where the relatively mobile cervical spine is attached to relatively fixed thoracic spine. single case report
what was counted	
how it was reported	
how it was used	case reports
source records	hospital records, ER records
body part(s) studied	spine, thoracic
severity coding	
miscellaneous related variables	belt-induced injury, belt use
sbul link?	no
results desc.	It was used to support the position that radiographic examinations following mv accidents should be extended to include views of the upper thoracic region. increase in neck injuries in those wearing seat belts at time of accident

source institution Royal Postgraduate Medical School & Hammersmith Hospital, England

document number	22	accession number	C-84-1311
reviewer	Miller	abstract only?	no

author	Hartemann, F. Henry, C. Faverjon, G. Tarriere, C. Got, C. Patel, A.	year volume number pages month or issue	1984
title	Ten years of safety due to the three-point seat belt		
source	Advances in Belt Restraint Systems: design, performance, and usage; Society of Automotive Engineers Int. Congress		
publication place	Warrendale, Pennsylvania		

indicator desc.	severe injury rates by part of body for belted vs. unbelted, also ejection rate French data (Renault). effectiveness of French SBUL
what was counted	injuries
how it was reported	% distribution, number, rates
how it was used	SBUL evaluation
source records	corporate records
body part(s) studied	head, neck/throat, neck, thorax, abdomen/pelvic contents, extremities/pelvis, lower extremities, pelvis
severity coding	AIS
miscellaneous related variables	crash configuration, ejection
sbul link?	yes
results desc.	injury severity and distribution by part of body for belted vs. unbelted ejection (-), severe head (-), chest (-), abdomen (-), pelvis (-), legs (-)

source institution	French data, (Renault)

document number	103	accession number	S-85-0867
reviewer	Landes	abstract only?	no

author	Henry, C. Faverjon, G. Thomas, C. Tarriere, C. Got, C. Patel, A.	year volume number pages month or issue	1981
title	Comparison of risks for restrained drivers and their front passenger in frontal collisions		
source	Proceedings of the 6th International IRCOBI Conference		
publication place			

indicator desc.	driver, fron passenger risk in frontal collisions, restrained drivers and front passengers are compared in frontal collisions
what was counted	injuries
how it was reported	number
how it was used	other evaluation
source records	corporate records
body part(s) studied	head, neck/throat, neck, spine, thorax, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities, pelvis
severity coding	AIS
miscellaneous related variables	seating position
sbul link?	no
results desc.	a comparison is made between severe injuries of drivers and front seat passengers (both restrained) no difference in proportion of injuries. most wounded body areas are identified (same for both front seat occupants). severity of injury (AIS) by body part differences are noted.

source institution	Peugeot-Renault Association

document number	67	accession number	Gurin
reviewer	Race	abstract only?	no

author	Highway Loss Data Institute	year	1986
		volume	
		number	
		pages	
		month or issue	

title: Insurance Special Report: a preliminary evaluation of New York and New Jersey insurance claim results before and after enactment of mandatory seat belt legislation, ...

source: Highway Loss Data Institute

publication place:

indicator desc.	New York, New Jersey insurance data
what was counted	insurance claims, costs
how it was reported	number
how it was used	SBUL evaluation
source records	insurance records
body part(s) studied	
severity coding	
miscellaneous related variables	
sbul link?	yes
results desc.	both states had lower overall injury claim frequency results after law was passed as compared to before

source institution: Highway Loss Data Institute
Watergate Six Hundred
Washington, DC 20037

document number	68	accession number	Gurin
reviewer	Race	abstract only?	no

author	Highway Loss Data Institute	year	1988
		volume	
		number	
		pages	
		month or issue	

title	Insurance Special Report: insurance injury loss experience in eight states with seat belt laws, 1983-1986 models
source	Highway Loss Data Institute
publication place	

indicator desc.	collision/injury claim frequencies and percentages insurance data
what was counted	insurance claims, costs
how it was reported	number
how it was used	SBUL evaluation
source records	insurance records
body part(s) studied	
severity coding	
miscellaneous related variables	
sbul link?	yes
results desc.	pre-post law comparisons: found no reductions in personal injury protection coverage claims in 1983-1986 model years. Relatively minor injuries. Post law injury claim frequencies and in some cases percent of collision coverage claims also having an injury claim was generally lower.

source institution	Highway Loss Data Institute Watergate Six Hundred Washington, DC 20037

document number	92	accession number	S-87-1523
reviewer	Benjamin	abstract only?	no

author	Hoffman, M.A. Spence, L.J. Wesson, D.E. Armstrong, P.F. Williams, J.I. Filler, R.M.	year volume number pages month or issue	1987 27 9 974-976 September
title	The pedicatric passenger: trends in seatbelt use and injury patterns		
source	Journal of Trauma		
publication place			

indicator desc.	severe head (-), solid viscera (-), lumbar spine (+), intestine injury (+), high cervical chord (+), lower extremity fractures (+) number of cases by body part injured
what was counted	hospital admissions, hospital stays
how it was reported	number
how it was used	case reports
source records	accident records, hospital records
body part(s) studied	external, head, face, thorax, abdomen/pelvic contents
severity coding	AIS, ISS
miscellaneous related variables	belt use
sbul link?	no
results desc.	tabulate number of cases vs. restraint or no restraint groups approximately equal pediatric study

source institution David E. Wesson
The Hospital for Sick Children
555 University Avenue
Toronto, Ontario, Canada M5G 1X8

document number	12	accession number	C-82-0775
reviewer	Miller	abstract only?	no

author	Huelke, D.F.	year	1981
		volume	
		number	
		pages	
		month or issue	

title	Effectiveness of occupant restraints in reducing serious injuries and fatalities
source	Proceedings of the International Symposium on Occupant Restraints, Toronto, June 1981
publication place	Morton Grove, Illinois; A.A.A.M.

indicator desc.	head, neck, chest, abdominal injuries (fatal and serious)
what was counted	injuries
how it was reported	rates
how it was used	safety belt effectiveness eval.
source records	accident records
body part(s) studied	head, neck/throat, neck, thorax, abdomen/pelvic contents, extremities/pelvis, lower extremities
severity coding	AIS, OAIS
miscellaneous related variables	crash configuration, belt use, ejection
sbul link?	no
results desc.	% reduction in number of cases by body part for fatalities and serious injuries for those wearing belts vs. unrestrained overall serious injuries (-), head (-), neck (-), chest (-), abdomen (-), legs (-)

source institution	NHTSA NCSS

document number	125	accession number	ILL
reviewer	Miller	abstract only?	no

author	Huelke, D.F.	year	1979
		volume	
		number	
		pages	
		month or issue	

title: Death and injuries prevented by lap-shoulder belt usage in the United States

source: 1979 International Symposium on Seat Belts in Tokyo

publication place:

---

indicator desc.:

what was counted: injuries

how it was reported: % distribution

how it was used: safety belt effectiveness eval.

source records: accident records

body part(s) studied: head, neck/throat, neck, thorax, abdomen/pelvic contents

severity coding: AIS

miscellaneous related variables: crash configuration, belt use

sbul link?: no

results desc.: frontal crash: serious head (-71%)
serious neck (-100%)
serious chest (-26%)

effectiveness of 64 % in reducing serious injury in rural high speed crashes

---

source institution:

document number	93	accession number	S-83-0576
reviewer	Benjamin	abstract only?	no

author	Huelke, D.F. Compton, C.P	year volume number pages month or issue	1983 41 241-244
title	Facial injuries in automobile crashes		
source	Journal of Oral and Maxillofacial Surgery		
publication place			

indicator desc.	AIS all levels: Facial injuries (-) AIS > or = 3: head (-), neck (-), face (-), chest (-), back (-), abdomen (-), extremities (-) All cases from towaway crashes, reported injuries to National Crash Severity Study. % body part injury to all occupants, not just front seat
what was counted	injuries
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	accident records, NCSS
body part(s) studied	face
severity coding	AIS, OAIS
miscellaneous related variables	vehicle parts, belt use
sbul link?	no
results desc.	tabulates % body part > or = 3 AIS, belted vs. nonbelted.

source institution	Huelke, HSRI U. of Michigan

document number	112	accession number	C-78-2690
reviewer	Benjamin	abstract only?	no

author	Huelke, D.F. Lawson, T.E.	year	1978
		volume	9
		number	1
		pages	11-15
		month or issue	July-Aug.
title	Injuries to rear-seat passengers in frontal automotive crashes		
source	HSRI Research Review		
publication place			

indicator desc.	injury vs. no injury % of accident occupants with no injury
what was counted	persons involved
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	accident records, HSRI data file (CPIR)
body part(s) studied	
severity coding	AIS
miscellaneous related variables	crash configuration, belt use, seating position, speed, age of occupant, car size
sbul link?	no
results desc.	tabulates belted vs. nonbelted

source institution HSRI Collision Performance and Injury Report File

document number	86	accession number	NSC
reviewer	Benjamin	abstract only?	no

author	Huelke, D.F. Lawson, T.E. Scott, R. Marsh, J.C.	year volume number pages month or issue	1977
title	The effectiveness of belt systems in frontal and rollover crashes		
source	Proceedings of the 6th International Conference of the International Association of Accidents and Traffic Medicine		
publication place			

indicator desc.	head (-), neck severe (-), neck minor (+), thorax (-), torso severe (-), lower extremity severe (-), ejection AIS 3-5 severity for drivers only
what was counted	injuries
how it was reported	
how it was used	safety belt effectiveness eval.
source records	accident records, CPIR, RSCS
body part(s) studied	head, neck/throat, neck, thorax, abdomen/pelvic contents, extremities/pelvis
severity coding	AIS, OAIS
miscellaneous related variables	crash configuration, belt use, seating position
sbul link?	no
results desc.	

source institution	U. of Michigan HSRI, used Collision Performance Injury Report (CPIR), and the Calspan Restraint System Effectiveness Study (RSES)

document number	114	accession number	S-82-0188
reviewer	Fearn	abstract only?	no

author	Huelke, D.F. O'Day, J.O. Barhydt, W.H.	year volume number pages month or issue	1982 22 1 50-52
title	Ocular injuries in automobile crashes		
source	Journal of Trauma		
publication place			

indicator desc.	eye injuries (incidence/nature) partial/permanent loss of visual acuity occular injuries in car crashes number of moderate to sever injuries to the eye
what was counted	injuries
how it was reported	number
how it was used	
source records	accident records
body part(s) studied	face, eye
severity coding	AIS
miscellaneous related variables	vehicle parts
sbul link?	no
results desc.	indicates the need for widespread use of high penetration resistant windshields cites a review article which indicated that use of lap/shoulder belts will decrease the frequency of eyeball injuries

source institution NHTSA NCSS

document number	94	accession number	C-87-1759
reviewer	Benjamin	abstract only?	no

author	Huelke, D.F. Sherman, H.W. Elliott, A.F.	year volume number pages month or issue	??
title	The rear seat occupant from data analysis of selected clinical case studies		
source	??		
publication place			

indicator desc.	AIS 3-6. Body part: head (face) (-), neck (-), chest (+), abdomen (+), extremities (-), back (-) Rear seat occupants, AIS by 6 categories, body part, number of cases
what was counted	persons injured
how it was reported	% distribution
how it was used	epidemiological studies
source records	accident records, FARS, NCSS, NASS, CPIR
body part(s) studied	
severity coding	MAIS
miscellaneous related variables	crash configuration, seating position, age of occupant
sbul link?	no
results desc.	tabulation of category vs. seat belt use

source institution	NCSS, NASS, FARS, Michigan '83 Accident files, CPIR/UMIVOR, University of Michigan Hospital

document number	72	accession number	S-75-0355
reviewer	Race	abstract only?	no

author	Huelke, D.F. Sherman, H.W. O'Day, J.O.
year	
volume	
number	
pages	
month or issue	
title	The hazard of the unrestrained occupant
source	Proceedings of the 18th Conference of the American Association for Automotive Medicine
publication place	

indicator desc.	injuries due to collision with other passengers including unrestrained hitting restrained occupant-to-occupant injuries
what was counted	injuries
how it was reported	number
how it was used	case reports
source records	accident records
body part(s) studied	head, face, neck/throat, neck, thorax, chest, abdomen/pelvic contents, extremities/pelvis, upper extremities
severity coding	AIS
miscellaneous related variables	occupant-to-occupant contact, vehicle parts
sbul link?	no
results desc.	analysis from performance and injury reports. UM 40,000 collisions (Long form Revision 3) General Motors occurs in 22 % of cars with more than 1 occupant upper body injuries

source institution	Highway Safety Research Institute (now UMTRI) University of Michigan

document number	8	accession number	C-82-0858
reviewer	Miller	abstract only?	no

author	Huelke, D. O'Day, J. Mendelsohn, R.	year volume number pages month or issue	1981 54 316-322 March
title	Cervical injuries suffered in automobile crashes		
source	Journal of Neurosurgery		
publication place			

indicator desc.	cervical spine injuries limited to cars towed from scene
what was counted	injuries
how it was reported	number
how it was used	safety belt effectiveness eval., epidemiological studies
source records	accident records
body part(s) studied	neck/throat, neck, spine, cervical
severity coding	AIS
miscellaneous related variables	crash configuration, vehicle parts, ejection
sbul link?	no
results desc.	very little relates to seat belts (see p. 319) cites other sources for positive effect of seat belts in reducing severe or fatal neck injuries Of 130 occupants with severe or fatal neck injury, only 4 had belts.

source institution NHTSA NCSS

document number	1	accession number	Gurin
reviewer	Miller	abstract only?	no

author	Hunter, W.W. Reinfurt, D.W. Hirsch, M.G.	year volume number pages month or issue	1988
title	Analysis of Occupant Restraint Issues from State Accident Data		
source	University of North Carolina Highway Safety Research Center		
publication place	Chapel Hill, North Carolina		

indicator desc.	number of injuries total, by injury type, part of body, ejections, various types of accidents tied to SBUL in New Jersey
what was counted	injuries
how it was reported	rates
how it was used	safety belt effectiveness eval., SBUL evaluation
source records	accident records
body part(s) studied	head, face, neck/throat, neck, spine, thorax, abdomen/pelvic contents, extremities/pelvis, upper extremities
severity coding	KABC
miscellaneous related variables	crash configuration, ejection, belt use, accident type, injury type
sbul link?	yes
results desc.	two types of analysis: 1) changes in injuries across time looking at period of seat belt use law in N.J. 2) comparison of restrained and unrestrained occupants in N.J. and Pennsylvania. Generally positive results. % (rate) of occupants injured with belts less than occupants without belts

source institution	New Jersey and Pennsylvania state accident records anaylzed by UNC HSRC. received by UNC HSRC from NHTSA

document number	25	accession number	C-85-3091
reviewer	Miller	abstract only?	no

author	Insurance Institute for Highway Safety	year	1985
		volume	20
		number	11
		pages	
		month or issue	October 5
title	British study links seat belt use to drop in injuries		
source	IIHS Status Report		
publication place			

indicator desc.	number of MV injuries, by part of body, hospital days, avg. injury severity scores data on 14,000 crash patients from 15 hospitals in England, Scotland, and Wales summary of original report. 14,000 crash patients from 15 hospitals in the U.K.
what was counted	hospital bed-days, hospital admissions, hospital stays, ER visits, injuries
how it was reported	% distribution, number
how it was used	SBUL evaluation
source records	hospital records
body part(s) studied	head, brain, face, neck/throat, neck, spine, thorax, heart/lung
severity coding	ISS
miscellaneous related variables	seating position, belt use
sbul link?	yes
results desc.	comparison of belted and unbelted drivers before and after law in U.K. ER-treated injuries (-), admissions (-), severe (-), multiple severe (-), multiple minor (-), major brain (+), facial fractures (+/-), minor scalp (+), spine (+), hospital days (-), minor face (-), lung (-)

source institution	see original study: Rutherford, Greenfield, et al.

document number	76	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Janssen, E.G.	year	1985
		volume	33
		number	4
		pages	73-76
		month or issue	April
title	Safety belts--the influence of the safety belt on the injuries of vehicle occupants in different kinds of collisions		
source	Verkeersrecht		
publication place			

indicator desc.	injury severity related to type of collision EMS reports ejections
what was counted	injuries
how it was reported	
how it was used	safety belt effectiveness eval.
source records	
body part(s) studied	
severity coding	
miscellaneous related variables	crash configuration, speed, ejection
sbul link?	no
results desc.	

source institution

document number	60	accession number	Gurin
reviewer	Race	abstract only?	no

author	Johnson, S.	year	
		volume	
		number	
		pages	
		month or issue	
title	Data base linkage and the sensitivity index		
source	Maine Health Information Center		
publication place	Augusta, Maine		

indicator desc.	patient records based on at scene reports (accident, ambulance), enroute (ambulance), at the hospital (discharge data), and/or vital statistics (death certificate) EMS reports
what was counted	persons injured
how it was reported	rates
how it was used	other evaluation, EMS system
source records	accident records, death certificates, hospital records, inpatient records
body part(s) studied	
severity coding	Champion's trauma score
miscellaneous related variables	
sbul link?	no
results desc.	data base includes restraint use information for traffic injuries. inconsistent use of E-codes by hospitals

source institution	Sandra W. Johnson, Director EMS Data Research Unit Maine Health Information Center 81 Winthrop Street Augusta, Maine 04330 (207) 623-2555

document number	35	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Johnston, P.B. Armstrong, M.F.	year	1986
		volume	70
		number	6
		pages	460-462
		month or issue	June
title	Eye injuries in Northern Ireland two years after seat belt legislation		
source	British Journal of Ophthalmology		
publication place			

indicator desc.	penetrating eye injuries (-)
what was counted	persons injured
how it was reported	number
how it was used	safety belt effectiveness eval.
source records	hospital records
body part(s) studied	face, eye
severity coding	
miscellaneous related variables	seating position
sbul link?	yes
results desc.	246 cases reviewed, 1984-1985. Motor-vehicle accidents caused 63 in front seaters. 60% reduction in incidence after law.

source institution	Royal Victoria Hospital, Belfast, Northern Ireland

document number	49	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Johnstone, B.R. Waxman, B.P.	year	1987
		volume	57
		number	7
		pages	455-460
		month or issue	July
title	Transverse disruption of the abdominal wall--a tell-tale sign of seat belt related hollow viscus injury		
source	Australia and New Zealand Journal of Surgery		
publication place			

indicator desc.	thorax/abdomen, bruised/fractured ribs and sternum hollow viscus, abdominal wall disruption, right rib fracture, left claricle fracture, right breast and spine complex of injuries in front seat passengers with harness and high speed
what was counted	injuries
how it was reported	number
how it was used	case reports
source records	hospital records, inpatient records
body part(s) studied	spine, thorax, heart/lung, ribs, abdomen/pelvic contents
severity coding	
miscellaneous related variables	crash configuration, belt use, seating position, speed
sbul link?	no
results desc.	5 case reports

source institution University of Melbourne
Department of Surgery

document number	5	accession number	Gurin
reviewer	Miller	abstract only?	yes
author	Junghans, K.	year	1978
		volume	
		number	
		pages	
		month or issue	
title	Seatbelt-related abdominal injuries		
source	Langenbecks Arch. Chir.		
publication place			
indicator desc.	abdominal injuries		
	German article		
what was counted	injuries		
how it was reported			
how it was used			
source records			
body part(s) studied	abdomen/pelvic contents		
severity coding			
miscellaneous related variables	belt-induced injury, belt use		
sbul link?	no		
results desc.	use of seat belts seems to decrease head injuries and increase abdominal injuries		
	head (-), abdominal lesions (+), abdominal wall injuries, liver ruptures		
source institution	German data base		

document number	118	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Kahnberg, K.E. Gothberg, K.A.	year	1987
		volume	16
		number	2
		pages	154-
		month or issue	April
title	Le Fort fractures (I). A study of frequency, etiology and treatment		
source	International Journal of Oral and Maxillofacial Surgery		
publication place			

indicator desc.	severity of maxillofacial fractures. classed as Le Fort I, II, III and partial maxillary
what was counted	injuries
how it was reported	number
how it was used	SBUL evaluation
source records	hospital records
body part(s) studied	face, mouth
severity coding	Le Fort number
miscellaneous related variables	
sbul link?	yes
results desc.	301 cases reviewed and tabulated 1969-1982. Law in 1975. Distribution of fractures has changed to less severe.

source institution

document number	6	accession number	Gurin
reviewer	Miller	abstract only?	yes

author	Karlson, Trudy	year	1982
		volume	22
		number	4
		pages	
		month or issue	
title	The incidence of hospital-treated facial injuries from vehicles		
source	Journal of Trauma		
publication place			

indicator desc.	facial injuries fractures, soft-tissue injuries, dental injuries
what was counted	ER visits, injuries
how it was reported	
how it was used	epidemiological studies
source records	hospital records, ER records
body part(s) studied	face
severity coding	AIS
miscellaneous related variables	vehicle parts, injury type
sbul link?	no
results desc.	unclear from abstract how much relates to seat belts

source institution	All Dane County, Wisconsin hospitals

Trudy Karlson
Center for Health Systems Research and Analysis
University of Wisconsin--Madison
1225 Observatory Drive
Madison, Wisconsin 53706

document number	48	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Keeling, P. Calthorpe, D. Lane, B. Collins, P.G.	year volume number pages month or issue	1987 18 2 93-95
title	Blunt injury of the neck of the pancreas: a report of nine patients		
source	Injury		
publication place			

indicator desc.	blunt injury to pancreas surgical diagnosis thorax/abdominal injuries
what was counted	persons injured
how it was reported	number
how it was used	case reports
source records	hospital records, inpatient records
body part(s) studied	abdomen/pelvic contents
severity coding	
miscellaneous related variables	belt use
sbul link?	no
results desc.	case reports. 8 of 9 in auto crash, 2 of 8 used seat belts probably not significant, 25 % seat belt use

source institution

document number	37	accession number	S-??????
reviewer	Benjamin	abstract only?	no

author	Larder, D.R. Twiss, M.K. Mackay, G.M.	year volume number pages month or issue	1985
title	Neck injury to car occupants using seat belts		
source	29th Annual Proceedings of the American Association for Automotive Medicine, Washington, DC, October, 1985		
publication place			

indicator desc.	neck injuries, soft tissue or sprain (+) AIS 0 in one group, higher in other group prolonged symptoms defined as > 1 month
what was counted	injuries
how it was reported	number, scores
how it was used	case reports
source records	accident records
body part(s) studied	neck, neck/throat
severity coding	AIS
miscellaneous related variables	belt use, vehicle parts, head restraint
sbul link?	no
results desc.	sample of reported cases, 282 neck injuries hospital records, questionnaire many cases not in data base because of minor nature, but symptoms persist restraints do not limit law AIS neck injuries in-depth investigation

source institution	Birmingham University Accident Research Unit

document number	116	accession number	Gurin
reviewer	Fearn	abstract only?	no

author	League General Insurance Company	year	1986
		volume	
		number	
		pages	
		month or issue	

title	Claims for severe injuries reduced 39 percent in first six months of Michigan safety-belt law, study by League General Insurance Co. shows
source	CUNA Mutual Insurance Group League General Insurance Company
publication place	

indicator desc.	number of insurance claims for severe injury
what was counted	insurance claims
how it was reported	rates, number
how it was used	SBUL evaluation
source records	insurance records
body part(s) studied	
severity coding	
miscellaneous related variables	
sbul link?	yes
results desc.	to assess impact of SBUL (desirable direction)
	severe injury claims (-)

source institution League General Insurance Company
G.P.O. Box 430-A
Detroit, Michigan 48232
1-800-431-7464

document number	40	accession number	??
reviewer	Benjamin	abstract only?	??

author	Lesoin et al.	year	1985
		volume	
		number	
		pages	
		month or issue	
title	Has the seat belt replaced the hangman's noose		
source	Lancet		
publication place			

indicator desc.	increase fractures of C2 spine injuries 28 of 35 cases wearing seat belts, no head rests
what was counted	
how it was reported	
how it was used	
source records	
body part(s) studied	
severity coding	
miscellaneous related variables	
sbul link?	
results desc.	35 case reports 1970-1984

source institution

document number	96	accession number	C-78-1202
reviewer	Benjamin	abstract only?	no

author	Mackay, G.M. Gloyns, R.F. Hayes, H.R.M. Griffiths, D.K. Rattenbury, S.J.	year volume number pages month or issue	1975
title	Serious trauma to car occupants wearing seat belts		
source	Proceedings of the 2nd International Conference on the Biomechanics of Serious Trauma		
publication place			

indicator desc.	head, neck, chest, arms, abdomen, spine, pelvis, legs front seat occupants, 3 point belts, AIS, body part injured no comparison with nonbelted
what was counted	injuries
how it was reported	number
how it was used	safety belt effectiveness eval.
source records	hospital records
body part(s) studied	head, neck/throat, neck, spine, thorax, abdomen/pelvic contents, extremities, pelvis
severity coding	AIS
miscellaneous related variables	crash configuration, belt use
sbul link?	no
results desc.	tabulates number of cases by AIS & body part no tabulation of non-seat belt biased study by selection

source institution	Accident Research Unit Birmingham, UK

document number	65	accession number	C-85-2302
reviewer	Benjamin	abstract only?	no

author	Mackay, M.	year	1985
		volume	
		number	
		pages	
		month or issue	

title	Two years' experience with the seat belt law in Britain
source	Society of Automotive Engineers Technical Paper Series 851234
publication place	Warrendale, Pennsylvania

indicator desc.	reduction in hospital admissions, injury patterns
	health care
	front seat occupants concussion(-), fractured skull(-), facial wounds (-), eye(-), rib fractures (+), internal chest (-), neck sprains (+), cervical fractures (-), lumbar sprains and fractures (+), abdominal injury (-)
what was counted	hospital admissions, hospital stays
how it was reported	% distribution, number
how it was used	SBUL evaluation
source records	accident records, hospital records
body part(s) studied	head, face, eye, neck/throat, neck, spine, cervical, lumbar, thorax, sternum, ribs, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities, pelvis
severity coding	
miscellaneous related variables	injury type, belt use
sbul link?	yes
results desc.	tabulates cases before and after law. General driving activity slightly up. Other accident, pedestrian & cyclists also show reductions. Drop is significant based on miles per driver.. Concussion (-), skull fracture (-), facial wounds (-), eye (-), rib fractures (+), internal chest (-), neck sprains (+), Cx fractures (-), lumbar sprains and fractures (+), abdominal injuries (-).

source institution	Department of Transport, United Kingdom

document number	101	accession number	C-87-2291
reviewer	Hoskin	abstract only?	no

author	Marburger, E.A. Friedel, B.	year	1987
		volume	27
		number	7
		pages	703-705
		month or issue	July

title: Seat belt legislation and seat belt effectiveness in the Federal Republic of Germany

source: Journal of Trauma

publication place:

---

indicator desc.: nature of injury, part of body,
hospital records of patients admitted for MV injuries

what was counted: injuries

how it was reported: number

how it was used: safety belt effectiveness eval.

source records: hospital records, inpatient records

body part(s) studied: head, face, eye, mouth, spine, cervical, thorax, heart/lung, Abdomen/pelvic, Extremities/pelvis, lower extremities

severity coding:

miscellaneous related variables: belt use

sbul link?: yes

results desc.: injuries reduced: head, knee fractures, soft-tissue injuries to lower extremities, cervical fractures, major live and lung injuries, intra-abdominal angiorrhexis, eye and jaw injuries.

Specific injuries increased: cervical distortions, minor soft-tissue injuries to pelvis and thorax

---

source institution:

document number	27	accession number	S-82-0141
reviewer	Miller	abstract only?	no

author	Mellbring, G Dahlin, S. Lindblad, B.	year volume number pages month or issue	 12 6 506-509
title	The hospital experience of seat belt legislation in the county of Skaraborg, Sweden		
source	Injury		
publication place			

indicator desc.	hospital admissions, injuries by AIS, by part of body, related to seat belt use comparison of belted vs. unbelted occupants part of body: head, neck, thorax, abdomen, pelvis, arm, leg
what was counted	hospital admissions, hospital stays, ER visits, injuries
how it was reported	% distribution, number
how it was used	SBUL evaluation
source records	accident records, hospital records, ER records
body part(s) studied	head, neck/throat, neck, thorax, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities, pelvis
severity coding	AIS
miscellaneous related variables	seating position, belt use
sbul link?	yes
results desc.	hospital admissions (-), number of injuries/front seat (-), head (-), neck (-), thorax (+, although less severe)

source institution	County Hospitals in Sweden

document number	4	accession number	S-85-0973
reviewer	Miller	abstract only?	no

author	Mills, P.J. Hobbs, C.A.	year	1984
		volume	
		number	
		pages	223-235
		month or issue	November

title	The Probability of Injury to car occupants in frontal and side impacts
source	SAE Techinical Paper Series
publication place	

indicator desc.	number of injuries by part of body head, chest, lower limb and pelvic injuries in frontal and side impacts towaway police data % reduction in probabilities with belts use vs. unrestrained
what was counted	injuries
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	hospital records, accident records
body part(s) studied	head, neck/throat, neck, thorax, abdomen/pelvic contents, extremities/pelvis, lower extremities, pelvis
severity coding	AIS, MAIS
miscellaneous related variables	crash configuration, belt use, seating position, speed
sbul link?	no
results desc.	see p. 234. front seat/front impact-- belts reduced injuries side impacts (seated on side of impact)-- significant reduction with belts English data, uses Probit analysis

source institution	*police data (from England ?)*

document number	104	accession number	??
reviewer	Race	abstract only?	yes
author	Moreland, J.D.	year	1962
		volume	5
		number	
		pages	95-111
		month or issue	
title	Safety belts in motor cars: an assessment of their effectiveness		
source	Annals of Occupational Hygiene		
publication place			
indicator desc.	damage index, car-weight ratio		
what was counted	injuries		
how it was reported			
how it was used	safety belt effectiveness eval.		
source records			
body part(s) studied			
severity coding			
miscellaneous related variables	belt use, damage index		
sbul link?	no		
results desc.	Given cars with the same damage index car/weight ratio, risk of injury was higher for 1) those ejected, 2) passengers vs. drivers, 3) those not wearing seat belts		
source institution			

document number	19	accession number	Gurin
reviewer	Miller	abstract only?	no

author	Mueller, E.	year	
		volume	
		number	
		pages	
		month or issue	
title	Trauma from auto accidents...		
source	unpublished draft		
publication place			

indicator desc.	number of injuries by severity score cost of medical treatment, admission to hospital
what was counted	hospital admissions, hospital stays, injuries, costs
how it was reported	scores
how it was used	safety belt effectiveness eval.
source records	hospital records, ER records, inpatient records
body part(s) studied	
severity coding	ISS
miscellaneous related variables	seating position, belt use
sbul link?	
results desc.	1,364 patients reviewed in 4 hospitals over 6 months 58 % wearing safety belt, 42% not 1.8 ISS for belt wearers, 4.51 for non-belt wearers belts are self-reported ?? belt use correlated to ability to pay for injuries sustained.

source institution	U. of Illinois Affiliated Hospitals (Lutheran General, Illinois Masonic, Mercy, Cook County) Elizabeth Mueller, M.D. Lutheral General Hospital Park Ridge, Illinois

document number	47	accession number	S-87-1205
reviewer	Benjamin	abstract only?	no

author	Muwanga, C.L Cole, R.P. Sloan, J.P. Bruce, E. Dove, A.F. Dave, S. H.	year volume number pages month or issue	1986 17 1 37-39 January
title	Cardian contusion in patients wearing seat belts		
source	Injury		
publication place			

indicator desc.	14 cases with chest injury, EKG changes, rise in CK-MB isoenzyme level thorax/abdominal injuries myocardial contusion(+), measured by enzyme CK + CK-MB
what was counted	hospital admissions, hospital stays
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval., case reports
source records	hospital records, inpatient records
body part(s) studied	heart/lung, thorax
severity coding	
miscellaneous related variables	seating position, belt use
sbul link?	no
results desc.	From 8 hours to 72 hours, look for rise of 4 % in indicator. Controls were both seat belt and non seatbelt. All cases had thoracic injuries, ribs or sternum fractures Not useful--all cases already have thoracic injuries.

source institution

document number	17	accession number	S-84-0258
reviewer	Miller	abstract only?	no

author	Newman, R.J. Jones, I.S.	year	1984
		volume	24
		number	2
		pages	129-135
		month or issue	
title	A prospective study of 413 consecutive car occupants with chest injuries		
source	Journal of Trauma		
publication place			

indicator desc.	chest injuries English hospital study used collision damage classification
what was counted	injuries
how it was reported	% distribution
how it was used	safety belt effectiveness eval.
source records	hospital records
body part(s) studied	head, face, neck/throat, neck, thorax, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities
severity coding	AIS, MAIS, ISS
miscellaneous related variables	crash configuration, seating position, vehicle parts, belt use, speed
sbul link?	no
results desc.	severity and type of chest injury compared for restrained vs unrestrained. percentage of some chest injuries increased for belt-wearers belt use decreased severity of injury

source institution	John Radcliffe Hospital Oxford, England

document number	84	accession number	NSC
reviewer	Benjamin	abstract only?	no

author	Nordentoft, E.L. Nielsen, H.V. Eriksen, E. Weeth, R.	year volume number pages month or issue	1977
title	Effect of mandatory seat belt legislation in Denmark, with special regard to minor and moderate injury		
source	Proceedings of the 6th International Conference of the International Association of Accidents and Traffic Medicine		
publication place			

indicator desc.	body parts: head (-), trunk (+), neck (+) per cent of total injury ascribed to body part denominator of rates: average daily traffic
what was counted	ER visits, injuries
how it was reported	% distribution, rates (denominator: average daily traffic)
how it was used	SBUL evaluation, epidemiological studies
source records	accident records, hospital records
body part(s) studied	head, neck/throat, neck, thorax, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities
severity coding	disability days
miscellaneous related variables	seating position, belt use, disability days
sbul link?	yes
results desc.	tabulates seat belt use vs. non belt use

source institution	Odense University Hospital, Denmark

document number	21	accession number	C-84-1311
reviewer	Miller	abstract only?	no

author	Norin, H. Carlsson, G. Korner, J.	year volume number pages month or issue	1984
title	Seat belt usage in Sweden and its injury reducing effect		
source	Advances in Belt Restraint Systems: design, performance, and usage; Society of Automotive Engineers Int. Congress		
publication place	Warrendale, Pennsylvania		

indicator desc.	head injury rate and chest injury rate comparison of rates before and after Swedish SBUL
what was counted	injuries
how it was reported	rates
how it was used	safety belt effectiveness eval., SBUL evaluation
source records	corporate records
body part(s) studied	head, thorax
severity coding	AIS
miscellaneous related variables	seating position, belt use
sbul link?	yes
results desc.	minor and moderate injuries (-), severe injuries (-), overall injury rate (-) minor to moderate chest (+), severe chest (-), minor to moderate head (-), severe head (-)

source institution	Volvo, Sweden

document number	127	accession number	ILL
reviewer	Miller	abstract only?	no

author	Nygren, A.	year	'82?
		volume	
		number	
		pages	
		month or issue	

title	Injuries to car occupants--some aspects of the interior safety of cars: a study of a 5-year material from an insurance company
source	Acta Otolaryngologica
publication place	

indicator desc.	
what was counted	injuries
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval., epidemiological studies
source records	insurance records, hospital records, accident records
body part(s) studied	head, face, neck/throat, neck, spine, thorax, abdomen/pelvic contents, extremities/pelvis
severity coding	ISS, AIS
miscellaneous related variables	crash configuration, seating position, accident type, belt use, injury type
sbul link?	no
results desc.	severe injuries occurred twice as often among unbelted front-seat passengers as belted ones. 3 times more often for unbelted drivers than belted. positive effect of seat belts in diminishing severity of injury. approximately 30 % decrease in number of injuries.facial injuries relatively high among belted drivers

source institution	Kaloniska Hospital, Sweden Folksam Insurance Group, Sweden

document number	3	accession number	C-84-1997
reviewer	Miller	abstract only?	no

author	O'Day, J. Scott, R.E.	year	1984
		volume	14
		number	5
		pages	1-5
		month or issue	
title	Myths and Realities of Seat Belt Use		
source	UMTRI Research Review		
publication place			

indicator desc.	consciousness after crash, ejection
what was counted	injuries, number of conscious occupants, number of ejections
how it was reported	% distribution, number, rates
how it was used	safety belt effectiveness eval.
source records	accident records
body part(s) studied	
severity coding	
miscellaneous related variables	ejection, belt use
sbul link?	no
results desc.	positive effect of belts on consciousness after crash and preventing ejection consciousness after crash (+), ejection (-)

source institution NCSS, NASS

document number	75	accession number	C-85-2298
reviewer	Benjamin	abstract only?	no

author	O'Day, J. Scott, R.E.	year	1984
		volume	11
		number	2
		pages	141-146
		month or issue	Summer
title	Safety belt use, ejection and entrapment		
source	Health Education Quarterly		
publication place			

indicator desc.	relates to fatalities EMS reports ejections
what was counted	injury episodes, ER visits
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	accident records, special studies
body part(s) studied	
severity coding	
miscellaneous related variables	ejection
sbul link?	no
results desc.	statistics on ejections, fire, submersion, with and without seat belts

source institution NASS, UMTRI, NCSS

document number	36	accession number	S-87-1110
reviewer	Benjamin	abstract only?	no

author	Olney, D.B. Marsden, A.K.	year	1986
		volume	17
		number	6
		pages	365-367
		month or issue	

title	The effect of head restraints and seat belts on the incidence of neck injury in car accidents
source	Injury
publication place	

indicator desc.	neck injuries head restraint evaluation
what was counted	ER visits, Injuries
how it was reported	number
how it was used	other evaluation
source records	hospital records, ER records
body part(s) studied	neck, neck/throat
severity coding	
miscellaneous related variables	belt use, vehicle parts
sbul link?	no
results desc.	Tabulations of indicator by restraints & seat belts, or none. 126 patients. No effect

source institution Accident and Emergency Department, Pinderfields General Hospital, Wakefield, England

document number	109	accession number	NSC
reviewer	Benjamin	abstract only?	no

author	Orsay, E.M. Turnbull, T.L. Dunne, M. Barrett, J.A. Langenberg, P. Orsay, C.P.	year volume number pages month or issue	1988 260 24 3598-3603 Dec.23/30
title	Prospective study of the effect of safety belts on morbidity and health care costs in motor-vehicle accidents		
source	Journal of the American Medical Association		
publication place			

indicator desc.	severity of injury, health care costs ISS based on AIS overall score ISS=sum of top three AIS, squared hospital charges
what was counted	hospital stays, hospital admissions, ER visits, costs
how it was reported	% distribution, averages
how it was used	safety belt effectiveness eval.
source records	hospital records, ER records, inpatient records
body part(s) studied	
severity coding	ISS
miscellaneous related variables	crash configuration, belt use, seating position, speed, alcohol use
sbul link?	no
results desc.	compares mean severity scores and costs for users vs. nonusers. Subsets by type of impact, position of victim.

source institution	Patricia Langenberg School of Public Health University of Illinois
	4 Chicago hospitals study of cases presented to ER aftermotor-vehicle accidents

document number	31	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Patel, B.C.K. Morgan, L.H.	year volume number pages month or issue	1988 5 1 21-25
title	Penetrating eye injuries in road traffic accidents		
source	Archives of Emergency Medicine		
publication place			

indicator desc.	penetrating eye injuries eye injuries (incidence/nature) (-) partial/permanent loss of visual acuity (-) visual loss from shattered windshields
what was counted	injuries
how it was reported	% distribution, number
how it was used	epidemiological studies
source records	hospital records, ER records, inpatient records
body part(s) studied	face, eye
severity coding	
miscellaneous related variables	vehicle parts
sbul link?	yes
results desc.	tabulated indicators by restraint use, also before and after law. 8 out of 8 before law, no seat belt. 6 out of 8 after law, no seat belt

source institution	Manchester Eye Hospital, England

document number	63	accession number	Gurin
reviewer	Race	abstract only?	no

author	Peterson, T.D.	year	1988
		volume	
		number	
		pages	
		month or issue	
title	Comparative summary of injuries and hospital costs in the belted vs. unbelted victims of motor-vehicle accidents		
source			
publication place			

indicator desc.	fractures, laceration, head injury, hospital admissions, hospital costs health care
what was counted	hospital admissions, hospital stays, injuries, costs, fractures, lacerations
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	hospital records
body part(s) studied	external, head, neck/throat, neck, spine, thorax, abdomen/pelvic contents, extremities/pelvis
severity coding	ISS
miscellaneous related variables	type of vehicle, ejection, belt use, injury type, crash configuration, seating position, speed, alcohol, age
sbul link?	no
results desc.	emergency rooms of 16 hospitals were surveyed, unbelted to belted victims

source institution Timothy D. Peterson, M.D.
Director, Iowa Safety Restraint Assessment Study
1200 Pleasant Street
Des Moines, Iowa 50309
(515) 224-6440
(515) 283-5070

document number	20	accession number	C-84-1313
reviewer	Miller	abstract only?	no

author	Petrucelli, E.	year	1984
		volume	
		number	
		pages	
		month or issue	

title	The USA and safety belt use: a prognosis for the remainder of the '80s
source	Advances in Belt Restraint Systems: design, performance, and usage; Society of Automotive Engineers Int. Congress
publication place	Warrendale, Pennsylvania

indicator desc.	intensive care unit admissions, plastic surgery clinic referrals, eye trauma clinic cases (cites other studies) cites results from other studies
what was counted	medical procedures, clinic visits
how it was reported	number
how it was used	safety belt effectiveness eval.
source records	
body part(s) studied	
severity coding	
miscellaneous related variables	
sbul link?	no
results desc.	referred to indicators cited from Canadian and English sources. intensive care unit admissions (-), plastic surgery clinic referrals (-), eye trauma clinic cases (-)

source institution	Canadian Ministry of Transportation and Communication

document number	100	accession number	S-87-1352
reviewer	Landes	abstract only?	no

author	Petrucelli, E.	year	1987
		volume	27
		number	7
		pages	706-710
		month or issue	July
title	Seat belt laws: the New York experience--preliminary data and some observations		
source	Journal of Trauma		
publication place			

indicator desc.	casualty reductions, includes fatalities, but also occupant injuries by severity, occupant head injuries. Compares 1985 with 1980-1984 average
what was counted	injuries, insurance claims
how it was reported	number, rates
how it was used	SBUL evaluation
source records	accident records, insurance records
body part(s) studied	head
severity coding	
miscellaneous related variables	belt use
sbul link?	yes
results desc.	positive effects of seatbelt law in N.Y. (as demonstrated by several factors)

source institution

document number	90	accession number	S-79-0531
reviewer	Benjamin	abstract only?	no

author	Petty, P.G.	year	1977
		volume	
		number	
		pages	
		month or issue	

title	The influence of seat belt wearing on the incidence of severe head injury
source	Proceedings of the 6th International Conference of the International Association for Accident and Traffic Medicine
publication place	

indicator desc.	head injury mild, severe mild defined as full faculties after one week severe defined as impaired faculties after one week
what was counted	injuries
how it was reported	number
how it was used	SBUL evaluation
source records	hospital records
body part(s) studied	head, face
severity coding	
miscellaneous related variables	
sbul link?	no
results desc.	incidence of head injuries from year to year. Seat belt use not recorded. Followed seat belt legislation, no records prior to legislation No good controls, essentially anecdotal study, but supports severe head injury as indicator.

source institution	Prince Henry's Hospital Melbourne, Australia

document number	121	accession number	ILL
reviewer	Miller	abstract only?	no

author	Pietrafesa, C.A. Hoffman, J.R.	year	1983
		volume	249
		number	24
		pages	3342-3346
		month or issue	June 24
title	Traumatic dislocation of the hip		
source	Journal of the American Medical Association		
publication place			

indicator desc.	
what was counted	injuries
how it was reported	number
how it was used	case reports
source records	hospital records
body part(s) studied	extremities/pelvis, pelvis
severity coding	
miscellaneous related variables	vehicle parts, belt use
sbul link?	no
results desc.	not an evaluation study. However, author states that regular use of seat belts would virtually eliminate this injury.

source institution

document number	15	accession number	C-82-0164
reviewer	Miller	abstract only?	no

author	Plueckhahn, V.D.	year	1980
		volume	20
		number	1
		pages	28-34
		month or issue	
title	Road traffic accidents and the prevention of injury and death of vehicle occupants		
source	Medical Science and the Law		
publication place			

indicator desc.	injuries per 10,000 vehicles
what was counted	injuries
how it was reported	rates
how it was used	SBUL evaluation
source records	accident records
body part(s) studied	
severity coding	
miscellaneous related variables	
sbul link?	yes
results desc.	rates before and after SBUL in Victoria, Australia
	injuries per 10,000 vehicles (-)

source institution

document number	123	accession number	ILL
reviewer	Miller	abstract only?	no

author	Prentice, N.A.J.	year	1979
		volume	
		number	
		pages	
		month or issue	
title	Seat belt effectiveness: possible benefits and advertising		
source	1979 International Symposium on Seat Belts in Tokyo		
publication place			

indicator desc.	
what was counted	injuries
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	accident records
body part(s) studied	head, neck/throat, neck, spine, thorax, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities, pelvis
severity coding	AIS
miscellaneous related variables	belt use
sbul link?	no
results desc.	positive effect of belts for almost all parts of body

source institution

document number	26	accession number	S-84-0815
reviewer	Miller	abstract only?	no

author	Pye, G. Waters, E.A.	year	1984
		volume	288
		number	
		pages	756-757
		month or issue	March 10
title	Effect of seat belt legislation on injuries in road traffic accidents in Nottingham		
source	British Medical Journal		
publication place			

indicator desc.	number of injuries by AIS before and after legislation part of body: face, head, neck, chest, all
what was counted	ER visits, injuries
how it was reported	number
how it was used	SBUL evaluation
source records	hospital records, ER records
body part(s) studied	head, face, neck/throat, neck, thorax
severity coding	AIS, ISS
miscellaneous related variables	
sbul link?	yes
results desc.	number of injuries (-), moderate injuries (-), severe injuries (-), face (-), head (-), neck (-), chest (+/-)

source institution large teaching hospital in the U.K.

document number	2	accession number	Gurin
reviewer	Miller	abstract only?	no

author	Reinfurt, D.W. Campbell, B.J. Stewart, J.R. Stutts, J.C.	year volume number pages month or issue	1988

title: North Carolina's Occupant Restraint Law: A Three-Year Evaluation (excerpts)

source: University of North Carolina Highway Safety Research Center

publication place: Chapel Hill, North Carolina

indicator desc.: number of moderate and serious injuries.
A & B injuries, using ABCK scale

what was counted: injuries

how it was reported: number

how it was used: SBUL evaluation

source records: accident records

body part(s) studied:

severity coding: KABC

miscellaneous related variables: seating position, belt use

sbul link?: yes

results desc.: time series for pre-law, warning phase, citation phase

positive effect of law on reducing injuries

serious and fatal injuries (-5.4 % warning phase, -14.6 % citation phase)

source institution: UNC HSRC
Reinfurt or Campbell

document number	10	accession number	NSC
reviewer	Miller	abstract only?	NO

author	Rutherford, W.H. Greenfield, T. Hayes, H.R.M. Nelson, J.K.	year volume number pages month or issue	
title	The Medical Effects of Seat Belt Legislation in the United Kingdom		
source	Her Majesty's Stationery Office		
publication place	London		

indicator desc.	ER arrivals (-), hospital admissions (-), bed occupancy (-), severe injuries (-), face (-), eye (-), brain (-), lung (-), sternum (+), neck sprain (+). Total number of injuries, injuries by severity, part of body, nature of injury, hospital admissions, and bed days. Parts of body: abdomen, pelvis, brain, eye, head/neck, rib, face, spine & back, thorax. Nature of injury: fractures, dislocations, sprain, abrasion, etc.
what was counted	hospital admissions, hospital stays, hospital bed-days, ER visits, injuries
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval., SBUL evaluation
source records	hospital records, ER records, inpatient records
body part(s) studied	head, cranium, brain, face, eye, mouth, neck/throat, neck, spine, cervical, thoracic, lumbar, thorax, heart/lung, sternum, ribs, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities, pelvis
severity coding	AIS, MAIS, ISS
miscellaneous related variables	seating position, belt use, injury type
sbul link?	yes
results desc.	see results on pp. 85-86

source institution	15 hospitals in the U.K.

document number	7	accession number	Gurin
reviewer	Miller	abstract only?	yes

author	Ryan, P. Ragazzon, R.	year	1979
		volume	49
		number	2
		pages	200-
		month or issue	April

title: Abdominal injuries in survivors of road trauma before and since seatbelt legislation in Victoria

source: Australia and New Zealand Journal of Surgery

publication place:

indicator desc.	abdominal injuries comparison of 7 years pre- and post-legislation (no change) counted number of hospital admissions mainly
what was counted	hospital admissions, hospital stays
how it was reported	number
how it was used	SBUL evaluation
source records	inpatient records, hospital records
body part(s) studied	abdomen/pelvic contents
severity coding	AIS
miscellaneous related variables	belt-induced injury
sbul link?	yes
results desc.	no change in proportion of admission for abdominal injuries, increase for number of admissions for gastrointestinal tract and diaphragm

source institution: St. Vincent's Hospital, Melbourne, Australia

document number	89	accession number	S-79-0530
reviewer	Benjamin	abstract only?	no

author	Sabey, B.E. Grant, B.E. Hobbs, C.A.	year volume number pages month or issue	1977
title	Alleviation of injuries by use of seat belts		
source	Proceedings of the 6th International Conference of the International Association for Accident and Traffic Medicine		
publication place			

indicator desc.	AIS 4-6 body parts: head (-), spine (-), neck (+), chest (-), abdomen (-), thigh (-), pelvis and hips (-), foot and ankle (+) injuries per 1,000 occupants Note: most studies give % distribution and do not include uninjured.
what was counted	injuries
how it was reported	number
how it was used	safety belt effectiveness eval.
source records	hospital records
body part(s) studied	head, neck/throat, neck, spine, thorax, abdomen/pelvic contents, extremities/pelvis
severity coding	AIS
miscellaneous related variables	seating position, belt use
sbul link?	
results desc.	tabulate AIS 0-6 measure belted reduction % vs. expected from unbelted with severity AIS 2-6

source institution	Transport and Road Research Laboratory Crowthorne, Berks, England

document number	91	accession number	S-87-1356
reviewer	Benjamin	abstract only?	no

author	Sato, T.B.	year	1987
		volume	27
		number	7
		pages	754-758
		month or issue	July

title	Effects of seat belts and injuries resulting from improper use
source	Journal of Trauma
publication place	

indicator desc.	body part: head (-), face (-), neck (+), arms (-), chest (+), abdomen (+), legs (-), Hospital stay. Body part, % distribution of injuries. Hospital stay --severe defined as > or = 30 days. parameter of speed
what was counted	persons injured
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	accident records
body part(s) studied	head, face, neck/throat, neck, thorax, abdomen/pelvic contents, extremities/pelvis
severity coding	
miscellaneous related variables	belt use
sbul link?	no
results desc.	tabulate % distribution for seat belt users vs. non-seat belt use. Serious stay vs. speed of impact

source institution	National Police Agency

document number	42	accession number	-79-0526
reviewer	Benjamin	abstract only?	no

author	Schmidt, G. Kallieris, D. Kappner, R. Mattern, R. Schult, F.	year volume number pages month or issue	1977
title	Forensic pathological and biomechanical experiences after the first year of mandatory belt wearing in the Federal Republic of Germany		
source	6th Annual Conference of the International Association of Accidents and Traffic Medicine		
publication place			

indicator desc.	per cent of all cases using seat belts spine injuries paraplegia, p.11 percent of all cases using seat belts
what was counted	injuries
how it was reported	% distribution, number
how it was used	literature review
source records	other literature
body part(s) studied	spine
severity coding	AIS
miscellaneous related variables	belt use
sbul link?	yes
results desc.	quoted from study

source institution References not given

document number	85	accession number	C-79-2629
reviewer	Benjamin	abstract only?	no

author	Seeney, K.M.	year	1977
		volume	
		number	
		pages	
		month or issue	
title	Queensland experience of compulsory wearing of seat belts		
source	Proceedings of the 6th International Conference of the International Association of Accidents and Traffic Medicine		
publication place			

indicator desc.	head (-), chest (-) per cent of total injuries by body part
what was counted	persons injured, injuries
how it was reported	% distribution, number
how it was used	SBUL evaluation
source records	hospital records
body part(s) studied	head, spine, thorax, abdomen/pelvic contents, extremities/pelvis
severity coding	
miscellaneous related variables	belt use
sbul link?	yes
results desc.	tabulates seat belt use vs. nonuse

source institution: Public Hospitals in Brisbane area, Australia

document number	70	accession number	C-87-0834
reviewer	Race	abstract only?	no

author	Sleet, D.A.	year	1984
		volume	11
		number	2
		pages	113-125
		month or issue	Summer
title	Reducing motor vehicle trauma through health promotion programming		
source	Health Education Quarterly		
publication place			

indicator desc.	estimated number of deaths and injuries saved (?) assumes 80 % compliance/preventable if belt use was mandated, breakdown by state
what was counted	injuries saved
how it was reported	
how it was used	
source records	
body part(s) studied	
severity coding	
miscellaneous related variables	state
sbul link?	no
results desc.	issue not relevant except for attached table

source institution Highway Users Federation

document number	52	accession number	S-87-2293
reviewer	Fearn	abstract only?	no

author	States, J.D. Huelke, D.F. Dance, M. Green, R.N.	year volume number pages month or issue	1987 27 7 740-745 July
title	Fatal injuries caused by underarm use of shoulder belts		
source	Journal of Trauma		
publication place			

indicator desc.	injuries, fatal and nonfatal, to the abdomen. including those to intestines, liver, spleen, kidneys, aorta, lungs and diaphragm, from wearing belts under arm or above pelvis
what was counted	injuries
how it was reported	
how it was used	case reports
source records	hospital records, ER records
body part(s) studied	thorax, heart/lung, ribs, abdomen/pelvic contents
severity coding	
miscellaneous related variables	belt-induced injury, crash configuration, belt use
sbul link?	no
results desc.	the indicator was used to illustrate that with the increased us of seat belts that comes about as a result of seat belt laws, so also will come cases of misuse and associated injuries. case studies increase inbelt use due to laws leads to increase in misuse and resulting injuries to abdomen, ribs, etc.

source institution

document number	62	accession number	Gurin
reviewer	Race	abstract only?	no

author	States, J.D. Ingersoll, G.L. Annechiarico, R.P. Carleen, E.D. Good, R.G. Lieou, J., et al.	year volume number pages month or issue	1986
title	The effect of the New York State safety belt law on hospital admissions in Monroe County (Rochester) New York		
source	30th Annual Proceedings of the American Association for Automotive Medicine		
publication place			

indicator desc.	injury patterns: total number, head, lower extremity injuries, serious chest/abdominal injuries health care
what was counted	hospital admissions, hospital stays
how it was reported	number
how it was used	SBUL evaluation
source records	accident records, hospital records, ER records, inpatient records
body part(s) studied	head, face, neck/throat, neck, spine, cervical, thoracic, lumbar, thorax, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities
severity coding	AIS, ISS, ICD
miscellaneous related variables	belt use, alcohol
sbul link?	yes
results desc.	decrease in hospital admissions also. info. based on police accident reports, medical examiner or local hospital, emergency room logs, hospital records

source institution	University of Rochester, Rochester, New York

document number	66	accession number	NSC ILL
reviewer	Race	abstract only?	no

author	Stewart, A.L. Ware, J.E. Brook, R.H.	year	1981
		volume	19
		number	5
		pages	473-488
		month or issue	May
title	Advances in the measurement of functional status: construction of aggregate indexes		
source	Medical Care		
publication place			

indicator desc.	measure of physical capacities and limitations general disability/rehabilitation
what was counted	persons involved
how it was reported	% distribution, number, scores
how it was used	chronic limitations index
source records	special questionnaire
body part(s) studied	
severity coding	
miscellaneous related variables	
sbul link?	no
results desc.	both chronic limitations and those of shorter duration

source institution Anita Stewart
Social Science Department
The Health Insurance Study
The Rand Corporation
1700 Main Street
Santa Monica, California 90406

document number	29	accession number	s-82-0129
reviewer	Landes	abstract only?	no

author	Tarriere, C. Leung, Y.C. Fayon, A.	year volume number pages month or issue	1981
title	Field facial injuries and study of their simulation with dummy		
source	Proceedings of the 25th STAPP Car Crash Conference, Society of Automotive Engineers, San Francisco, Calif.		
publication place			

indicator desc.	face (except eye) facial/jaw injuries
what was counted	injury episodes, injuries
how it was reported	% distribution, number
how it was used	epidemiological studies
source records	corporate records
body part(s) studied	head, face
severity coding	AIS
miscellaneous related variables	speed
sbul link?	
results desc.	

source institution

document number	9	accession number	NSC
reviewer	Miller	abstract only?	no

author	Thode, H.C. Barancik, J.I.	year	1987
		volume	
		number	
		pages	
		month or issue	
title	Use of Logistic Regression in the New York State Seatbelt Law		
source	Presented at the 1987 Joint Statistical Meetings, San Francisco, August 1987		
publication place			

indicator desc.	injuries by severity, part of body and nature of injury
	ties results to NY SBUL
what was counted	injuries, ER visits
how it was reported	rates
how it was used	epidemiological studies, SBUL evaluation
source records	hospital records, ER records
body part(s) studied	head, face, neck/throat, neck, spine, cervical, thorax, abdomen/pelvic contents, extremities/pelvis, upper extremities, lower extremities
severity coding	AIS
miscellaneous related variables	injury type
sbul link?	yes
results desc.	document is marked "Draft, not to be cited"
	regression analysis for pre- / post-law.
	Found head and neck injuries decreased after law. head (-), neck (-), cervical strain with other spinal injury (-) Also in particular, external injuries to head decreased after law. Face (-), thorax/abdomen (+), extremities (+), cervical strain (+), nose/jaw fractures (+).

source institution	all hospitals in Suffolk County, New York
	data gathered by Brookhaven National Laboratory and Department of Community and Preventive Medicine at S.U.N.Y. at Stony Brook

document number	79	accession number	S-81-0681
reviewer	Benjamin	abstract only?	no

author	Thomas, C. Faverjon, G. Henry, C. Tarriere, C. Got, C. Patel, A.	year volume number pages month or issue	1980
title	Comparative study of 1,624 belted and 3,242 non-belted occupants: results on the effectiveness of seat belts		
source	Proceedings of the 24th Conference of the American Association for Automotive Medicine		
publication place			

indicator desc.	head injuries, pelvic injuries by AIS, ejection--yes, no
what was counted	injury episodes, injuries
how it was reported	% distribution
how it was used	safety belt effectiveness eval.
source records	accident records, supplemented by in-depth investigation of accident by team
body part(s) studied	head, thorax, abdomen/pelvis
severity coding	AIS
miscellaneous related variables	crash configuration, ejection, belt use, speed
sbul link?	no
results desc.	incidence tabulated ?? use of seat belt

source institution

document number	120	accession number	ILL
reviewer	Miller	abstract only?	no

author	Thompson, J.F. Wood, R.F.M. Cahill, A.P. Franklin, P.M. Morris, P.J.	year	1983
		volume	287
		number	
		pages	1260-1261
		month or issue	Oct. 29
title	Kidney transplantation and seat belt legislation		
source	British Medical Journal		
publication place			

indicator desc.	
what was counted	consumption of medical supplies
how it was reported	number
how it was used	SBUL evaluation
source records	hospital records
body part(s) studied	abdomen/pelvic contents
severity coding	
miscellaneous related variables	
sbul link?	yes
results desc.	SBULs have small effect on number of donors. Of 100 kidney donors in year before law, only 9 were car occupants

source institution

document number	81	accession number	C-79-2624
reviewer	Benjamin	abstract only?	no

author	Toomath, J.B.	year	1977
		volume	
		number	
		pages	
		month or issue	
title	Compulsory seat belt legislation in New Zealand		
source	6th International Conference of the International Association for Accidents and Traffic Medicine		
publication place			

indicator desc.	body part: head(-), neck(+), trunk(+), ejections(-), trunk (+), shoulder (-), steering wheel (+), also mechanisms of injury
what was counted	injury episodes
how it was reported	% distribution
how it was used	SBUL evaluation
source records	accident records
body part(s) studied	
severity coding	
miscellaneous related variables	belt use
sbul link?	yes
results desc.	tabulated percentages of total injuries ascribed to indicator

source institution	National Statistics Traffic Research *New Zealand*

document number	98	accession number	C-80-3588
reviewer	Benjamin	abstract only?	no

author	Trinca, G.	year	1980
		volume	8
		number	
		pages	36-38
		month or issue	
title	Medical aspects of seat belt usage		
source	Journal of Traffic Medicine		
publication place			

indicator desc.	severity, ejection, head (-), face (-), chest (-), eye injuries (-), spinal cord (-), knee and thigh (-), sternum fractures (+) literature review indicators not defined some percentages given
what was counted	
how it was reported	
how it was used	
source records	
body part(s) studied	
severity coding	
miscellaneous related variables	
sbul link?	no
results desc.	quoted from a number of articles

source institution	Gordon W. Trinca, OBE, MBBS, FRACS Chairman, National Road Trauma Committee Royal Australasian College of Sugeons Senior Surgeon, Preston & Northcote Community Hospital Melbourne, Australia

document number	23	accession number	C-84-1309
reviewer	Miller	abstract only?	no

author	Trinca, G.W.	year	1984
		volume	
		number	
		pages	
		month or issue	
title	Thirteen years of seat belt usage: how great the benefits		
source	Advances in Belt Restraint Systems: design, performance, and usage; Society of Automotive Engineers Int. Congress		
publication place	Warrendale, Pennsylvania		

indicator desc.	number and severity of head and chest injuries, number of MV injuries treated at hospitals. experience in Victoria, Australia, effects of SBUL in Australia
what was counted	hospital admissions, hospital stays, ER visits, injuries
how it was reported	% distribution
how it was used	SBUL evaluation
source records	hospital records, ER records, accident records
body part(s) studied	head, thorax
severity coding	AIS, MAIS
miscellaneous related variables	belt use
sbul link?	yes
results desc.	% distributions by part of body for users and nonusers. head (-), chest (+/-), hospital admissions (-)

source institution	hospital data from Australia Preston and Northcote Community Hospital

document number	124	accession number	ILL
reviewer	Miller	abstract only?	no

author	Trinca, G.W.	year	1979
		volume	
		number	
		pages	
		month or issue	
title	Medical aspects of seat belt usage		
source	1979 International Symposium on Seat Belts in Tokyo		
publication place			

indicator desc.		
what was counted	injuries	
how it was reported	rates, number	
how it was used	safety belt effectiveness eval., SBUL evaluation	
source records	hospital records	
body part(s) studied	head, face, thorax	
severity coding		
miscellaneous related variables	vehicle parts, ejection, belt use	
sbul link?	yes	
results desc.	belt wearers: injuries of a lower average severity lower probability of severe head injury probability of face and chest injury lower probability of ejection	lower

source institution

document number	107	accession number	C-77-2464
reviewer	Race	abstract only?	no

author	Trinca, [illegible] Dooley, B.J.	year	1975
		volume	1
		number	
		pages	675--678
		month or issue	May 31

title	The effects of mandatory seat belt wearing on the mortality and pattern of injury of car occupants involved in motor vehicle crashes in Victoria
source	Medical Journal of Australia
publication place	

indicator desc.	general breakdown of injury types for front and side impacts hospital admissions
what was counted	hospital admissions, hospital stays, ER visits
how it was reported	
how it was used	SBUL evaluation
source records	hospital records
body part(s) studied	thorax, sternum, abdomen/pelvic contents, extremities/pelvis, pelvis
severity coding	
miscellaneous related variables	belt-induced injury, crash configuration
sbul link?	yes
results desc.	basic injury information

source institution	Preston and Northcote Community Hospital, Victoria, Australia Road Trauma Committee of the Royal Australasian College of Surgeons

document number	73	accession number	S-88-0718
reviewer	Benjamin	abstract only?	no

author	Tunbridge, R.J. Everest, J.T. Wild, B.R. Johnstone, R.A.	year volume number pages month or issue	1988
title	An in-depth study of road accident casualties and their injury patterns		
source	Transport and Road Research Laboratory, Department of Transport, United Kingdom		
publication place			

indicator desc.	MAIS, ejection, entrapment MAIS 0-6, fatal EMS reports ejections
what was counted	hospital admissions, hospital stays, ER visits, injuries, disability days
how it was reported	% distribution, number
how it was used	other evaluation
source records	hospital records, ER records
body part(s) studied	
severity coding	MAIS
miscellaneous related variables	seating position, ejection
sbul link?	no
results desc.	tabulate AIS vs. belted and unbelted. Also has information on body part distribution for MAIS > or = 3 by location for belted only

source institution	Accident Service John Radcliffe Hospital Oxford, England

document number	111	accession number	S-87-0402
reviewer	Benjamin	abstract only?	no

author	Vallet, G. Ramet, M. Debiez, G.	year volume number pages month or issue	1986
title	Seat belt efficiency: paired case study with unbelted and belted occupants		
source	*Proceedings of the IRCOBI Conference, 1986*		
publication place			

indicator desc.	accident severity, MAIS front occupants
what was counted	
how it was reported	
how it was used	safety belt effectiveness eval.
source records	
body part(s) studied	
severity coding	AIS, OAIS
miscellaneous related variables	crash configuration, belt use, seating position
sbul link?	no
results desc.	paired by accident severity (vehicle damage index) seat belt vs. non seat belt AIS

source institution	Laboratoire des Chocs et de Biomecanique FRANCE

document number	108	accession number	C-76-3116
reviewer	Race	abstract only?	no

author	Vaughan, R.G. Wood, R. Croft, P.G.	year volume number pages month or issue	1974 7 5 103-127
title	Some aspects of compulsory seat belt wearing		
source	ARRB Proceedings		
publication place			

indicator desc.	injury patterns, don't know if data based on lap or lap-shoulder belt
what was counted	persons injured, hospital stays, hospital admissions, hospital bed-days, accidents
how it was reported	averages, number
how it was used	SBUL evaluation
source records	hospital records
body part(s) studied	head, cranium, neck/throat, neck, spine, thorax, sternum, extremities/pelvis, upper extremities, lower extremities, pelvis
severity coding	
miscellaneous related variables	
sbul link?	yes
results desc.	see specifically paragraphs 26 through 40

source institution	Accident Analysis Section Traffic Accident Research Unit Department of Motor Transport New South Wales, Australia

document number	51	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Vellar, I.D. Vellar, D.J. Mullany, C.J.	year volume number pages month or issue	1976 1 19 694-696 May 8
title	Rupture of the bowel due to road trauma		
source	Medical Journal of Australia		
publication place			

indicator desc.	rupture of the bowel (+) surgical diagnosis abdominal injuries
what was counted	hospital admissions, hospital stays
how it was reported	number
how it was used	case reports
source records	hospital records, inpatient records
body part(s) studied	head, face, abdomen/pelvic contents
severity coding	
miscellaneous related variables	vehicle parts, belt use
sbul link?	no
results desc.	case reports 1956-June 1976. 1956-1970, 5 cases, all no belts. 1971-1975, 11 cases, 8 with belts severe head injuries (-) severe face injuries (-) rupture of the bowel (+)

source institution	St. Vincent's Hospital, Melbourne, Australia

document number	30	accession number	S-85-0064
reviewer	Hoskin	abstract only?	no

author	Vernon, S.A. Yorston, D.B.	year	1984
		volume	77
		number	3
		pages	198-200
		month or issue	March
title	Incidence of ocular injuries from road traffic accidents after introduction of seat belt legislation		
source	Journal of the Royal Society of Medicine		
publication place			

indicator desc.	To assess change in pattern of eye injuries follow SBUL eye injuries (incidence/nature)
what was counted	ER visits
how it was reported	number
how it was used	epidemiological studies
source records	hospital records, ER records, inpatient records
body part(s) studied	face, eye
severity coding	
miscellaneous related variables	belt use, vehicle parts
sbul link?	yes
results desc.	eye injuries (-)

source institution

document number	117	accession number	Gurin
reviewer	Fearn	abstract only?	no

author	Waltham-Newton Tribune	year	1986
		volume	
		number	
		pages	
		month or issue	
title	Newton-Wellesley Hospital helps with study		
source	Waltham-Newton Tribune, 11-6-86		
publication place			

indicator desc.	treatment cost of rehabilitation total medical costs of accident victims total medical costs of belted vs. unbelted occupants and pre-/post-law
what was counted	ambulance runs, costs
how it was reported	% distribution, averages
how it was used	safety belt effectiveness eval., SBUL evaluation
source records	hospital records
body part(s) studied	
severity coding	
miscellaneous related variables	belt use
sbul link?	yes
results desc.	examined effects of belt wearing on total medical costs of accident victims preliminary data indicated as much as a 25 % reduction in medical costs during a 4-month period following implementation of the law

source institution	Dr. Charlotte Yeh Massachusetts Chapter of Emergency Physicians

document number	87	accession number	S-79-0527
reviewer	Benjamin	abstract only?	no

author	Walz, F. Niederer, P. Zollinger, U. Renfer, A.	year volume number pages month or issue	1977
title	Analysis of 115 killed and 205 severely injured (OAIS > or = 2) seat belt users		
source	Proceedings of the 6th International Conference of the International Association of Accidents and Traffic Medicine		
publication place			

indicator desc.	body parts, AIS percent of total injuries AIS > or = 2
what was counted	injuries
how it was reported	% distribution, number
how it was used	safety belt effectiveness eval.
source records	accident records, hospital records
body part(s) studied	head, face, spine, cervical, thoracic, lumbar, thorax, abdomen/pelvic contents
severity coding	AIS, OAIS
miscellaneous related variables	ejection, belt use, crash configuration
sbul link?	no
results desc.	cataloguing of injuries in seat belt users, tabulations of percent distributions by body part

source institution: Institute of Forensic Medicine
University of Zurich
Swiss Federal Police Department

document number	46	accession number	NSC ILL
reviewer	Race	abstract only?	no

author	Watson, N.	year	1983
		volume	21
		number	1
		pages	63-64
		month or issue	Feb. 1
title	Road traffic accidents, spinal injuries and seat belts		
source	Paraplegia		
publication place			

indicator desc.	spine injuries (motor-vehicle related) Australian/U.K. experience
what was counted	injuries, costs
how it was reported	
how it was used	
source records	hospital records, inpatient records
body part(s) studied	spine
severity coding	
miscellaneous related variables	ejection
sbul link?	No
results desc.	probability of spinal injury if ejected

source institution Spinal Injuries Unit
Lodge Moor Hospital
Sheffield 10 England

document number	71	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Wild, B.R. Kenwright, J. Rastogi, S.	year volume number pages month or issue	1985 290 6482 1621-1623
title	Effect of seat belts on injuries to front and rear seat passengers		
source	British Medical Journal		
publication place			

indicator desc.	effect of injury by passenger to passenger collision. definition of indicator not clear. "injury", incidence of injury occupant-to-occupant injuries
what was counted	injuries
how it was reported	
how it was used	safety belt effectiveness eval.
source records	
body part(s) studied	
severity coding	
miscellaneous related variables	occupant-to-occupant contact, seating position
sbul link?	no
results desc.	2,520 occupants of cars, front and rear seat passenger interaction by seat belt and no seat belt. Restraints decrease injury incidence

source institution	Oxford Road Accident Group John Radcliff Hospital, Oxford, England

document number	57	accession number	DIALOG
reviewer	Benjamin	abstract only?	yes

author	Wojcik, J.B. Morgan, A.S.	year	1988
		volume	17
		number	9
		pages	912-914
		month or issue	September
title	Sternal fractures--the natural history		
source	Annals of Emergency Medicine		
publication place			

indicator desc.	ribs/sternum/pelvis bruised/fractured sternum
what was counted	hospital admissions, hospital stays
how it was reported	% distribution, number
how it was used	case reports
source records	hospital records
body part(s) studied	thorax, heart/lung, sternum, ribs
severity coding	
miscellaneous related variables	belt use
sbul link?	
results desc.	66 cases, 59 % in mv accidents most did not wear seat belts. 18% myocardial contusion

source institution	Trauma Unit, St. Vincent Hospital, Hartford, Connecticut

PART B

EXPERT TEAM COMMENTS ON INDICATORS

[See page B-71 for an index of indicators included in Part B.]

Notes: Numbers (e.g., 33) are used to identify expert team members. The same number is used for a particular expert in all parts of this report.

A summary of the expert team ratings of each indicator may be found in Volume I, Appendix D.

Indicators were rated as follows:

+ = an indicator with promise that should be fully explored.

0 = an indicator with unknown promise that should be given some attention during the project.

- = an indicator with little or no promise that should be eliminated from further consideration during this project.

DK = no opinion about this indicator (includes no response).

Items marked 0/+ and 0/- were tallied as 0.

Indicator: INCIDENCE OF ACCIDENT REPORTS -- BY POLICE -- BY DRIVER

Expert	Rating	Comments
1	0	
2	0	I don't believe accidents are prevented by seat belt usage but (hopefully) seat belt usage displays less severe injury results in accidents
4	+	
5	0	ok (probably/in non-law states probably useless because of "lie" factor in belt law states
7	+	
8	+	this will be necessary to derive a denominator for other indicators # ejections/crashes
9	+	
12	+	
13	0	
18	-	
19	-	not very useful unless belt use & injury severity recorded reliably by police
25	+	provides basic ref. data
26	+	to show changes in distributions of severity of injuries pre- and post-belt law
28	-	too ambiguous and prone to reporting levels and artifacts
29	-	Do you mean accidents involving injuries - not just accidents - Seat belts are not intended to reduce as per se.
30	-	the indicators rated (-) seem to be based on numbers of accidents or occupants involved in accidents which Mul would not be expected to affect to any great extent, or are surrogate measures for accident severity for which other more precise, measure may be available
31	+	
33	+	especially if injury severity is assessed by improved scale, i.e., New York -problem may be slow input
35	0	
37	-	unless objective indication of belt use is implemented
38	+	subject to reporting bias
Unknown	0/+	increasing, with SBUL in effect, we see all drivers claiming belt use
Unknown	-	

Indicator: INCIDENCE OF EMERGENCY MEDICAL SERVICE (EMS) CALLS FOR CRASHES; FREQUENCY/RATE

Expert	Rating	Comments
1	+	Do not expect crashes to decrease but can look at injury crashes, vs. property crashes & combine with Trauma Center data.
2	0	
4	+	
5	-	too weak an indicator by itself to detect change
7	dk	
8	0	
9	-	
12	+	
13	0	
18	-	
19	0	need to distinguish between occupants and non-occupants
25	+	Provides basic ref. data
26	+	
27	-	wide variability or service availability rural/urban would miss persons arriving by private vehicle
28	+	
29	-	
30	-	
31	+	
33	+	
35	0	
37	-	Biased to minor/moderate severity accidents which belt use may not affect
38	-	difficult to get EMT observations/would have to rely on victim self report or police rept.
Unknown	+	
Unknown	+	

Indicator: AMBULANCE RUN REPORTS

Expert	Rating	Comments
1	-	Meaningless
2	+	
4	0	could supplement primary data, from eg police
5	+	maybe they could get belt use on a less biased basis
7	dk	
8	0	
9	+	
12	+	
13	0	
18	-	
19	-	
25	+	must be designed to reflect safety belt usage
26	+	
27	0	currently lacks uniform date set and documentation is often sub standard or incomplete
28	0	
29	dk	This is non-specific - what would you be looking for here?
30	-	
31	+	
33	NR	How is this indicator different from EMS call reports
35	-	
37	-	Biased to minor/moderate severity accidents that belt use may not affect.
38	+	
Unknown	+	
Unknown	+	

Indicator: TRAUMA SCORE (CHAMPION, 1981)

Expert	Rating	Comments
1		(not in isolation)
2	+	
4	dk	
5	-	bias; based on those who show up at the hospital
7	0	
8	+	use with the Injury Severity Scale (155) to compare injury severity of populations pre and post belt laws
9	-	
12	+	
13	0	
18	+	
19	dk	
25	0	poor indicator
26	+	
27	+	
28	+	
29	dk	Not intended for police use - EMS personnel
30	dk	
31	+	Would need to be careful that all are using the Trauma Score and not the Revised Trauma Score - if the latter? weighted or unweighted?
33	+	would improve discrimination of EMS reports and permit stratification
35	0	
37	+	Assessing changing patterns/severity of injury is important
38	dk	
Unknown	0	
Unknown	+	

Indicator: NUMBER/PERCENT OF CASES TRANSPORTED BY AMBULANCE

Expert	Rating	Comments
1	-	meaningless
2	0	
4	NR	is this not included in ambulance run reports?
5	0	maybe
7	dk	
8	0	
9	-	
12	+	
13	-	extremely sensitive to variations in practice/rules for EMS
17	NR	
18	+	Add MVA to Indicator Name
19	-	too unspecific
25	0	
26	+	
27	-	as above: variability, poor documentation
28	0	
29	-	
30	-	
31	+	number rather than percent
33	-	no satisfactory (uniform) bottom line
35	-	
37	-	Biased to minor/moderate severity accident that belt use may not affect
38	-	how do you relate this to belt use, may be proxy measure
Unknown	+	
Unknown	-	

Indicator: HELICOPTER RUN REPORTS

Expert	Rating	Comments
1	-	very small sample
2	dk	
4	-	
5	-	bias; only done in certain biased instances
7	-	
8	0	
9	-	
12	-	expect numbers are too small
13	-	
18	-	
19	-	to unspecific
25	+	useful if other EMS data are gathered as well
26	0	probably too few cases?
27	0	many confounding factors & poor documentation & utilization due to: 1) more air medical service available 2) hospital marketing 3) pressure, medical/ legal pressures 4) distance vs. level of care concerns
28	-	too infrequent - dependent on regional differences in helicopters
29	-	
30	-	Helicopter transfer is a function of how trauma system is organized and triage definitions
31	+	
33	-	Non uniform guidelines for dispatch - Most of country not covered
35	-	
37	dk	probably too few numbers
38	-	how do you relate this to belt use, may be proxy measure
Unknown	-	Not representative of general population
Unknown	+	Threshold for helicopter transfer dependent on many factors most SBU info is second hand

Indicator: NUMBER/PERCENT OF CASES TRANSPORTED BY HELICOPTER

Expert	Rating	Comments
1	-	
2	dk	
4	-	
5	-	
7	-	
8	-	
9	-	
12	-	expect numbers are too small
13	-	
18	-	add MVA to Indicator name
19	-	too unspecific
25	+	useful if other EMS data is gathered as well
26	dk	
27	0	many confounding factors & documentation utilization due to 1) more air medical service available 2) hospital marketing pressure 3) medical/legal pressures 4) distance vs. level of care concerns
28	-	too infrequent dependent on regional differences in helicopter
29	-	
30	-	
31	+	Number rather than percent
33	-	Non uniform guidelines for dispatch
35	-	
37	dk	probably too few numbers
38	-	how do you relate this to belt use, may be proxy measure
Unknown	-	Threshold for helicopter transfer dependent upon many factors, including Eton use. Also, most are secondary transfers-most SBU info is second hand
Unknown	-	

Indicator: NUMBER/RATE OF EJECTIONS

Expert	Rating	Comments
1	+	
2	0	the number of ejections may be significantly related to belt usage but is that what the variable implies?
4	+	
5	+	good; if you can get it
7	0	
8	+	
9	+	
12	+	
13	+	but need criteria regarding partial ejection
18	+	
19	+	should decrease as belt use increases but it may be difficult to determine whether ejection occurred
25	+	
26	+	
27	+	
28	+	
29	+	Assumes baseline data
30	0	
31	+	number rather than percent
33	+	
35	0	
37	+	good measure if properly reported
38	+	has promise. Would you collect from police reports?
Unknown	+	
Unknown	+	

Indicator: EMS REPORTED BELT-USE AMONG CRASH VICTIM; PERCENT OF BELT WEARERS FOUND AMONG CRASH VICTIMS AND FATALITIES

Expert	Rating	Comments
1	+	
2	+	
4	+	potentially useful, may be problems with reliability especially if there are insurance implications
5	+	maybe
7	0	
8	+	our experience has shown this to be relatively unreliable but somehow belted vs. unbelted must be determined if we intend to compare injury severity
9	+	
12	+	
13	0	
18	+	
19	+	as long as belt use is reported reliably by EMS staff
25	+	
26	0	how often do EMS record this information? may lack reliability if EMS not the first on the Scene
27	+	often the only source to verify
28	+	
29	+	Particularly useful in assessing belt use in serious crashes
30	0/+	
31	+	The belted status of crash victim is important. Our experience is that patients' answers to medical personnel appear to be reasonably truthful & accurate. Fairly high motivation is required by paramedics or ER staff to collect this info in every case.
33	+	
35	0	
37	-	Unless objective indication of belt use is achieved**
38	+	Has promise would you collect from police reports
Unknown	0	see indicator "Helicopter run reports" I have little faith in SBU or speed as reported by victims
Unknown	+	

Indicator: EMERGENCY ROOM VISITS

Expert	Rating	Comments
1	+	for MV Occupant trauma
2	0	
4	0	depends on scope of data collected
5	-	probably too crude to detect change
7	0	
8	0	total of visits/# accidents of given severity could provide crude measure of injury severity
9	-	
12	dk	changes could be due to many causes
13	0	
18	-	
19	0	need to specify occupants of vehicle
25	0	would require reorientation of personnel
26	+	
27	+	
28	-	Too ambiguous and insensitive unless limited to traffic accident trauma
29	+	Assume baseline data (before/after comparisons)
30	+	
31	+	
33	+	useful if based on defined population
35	0	
37	-	Could be ok but biased to minor & moderate severity accidents that safety belt use may not affect.
38	+	how do you relate to belt use potential as proxy measure
Unknown	0/+	high importance
Unknown	-	

Indicator: REDUCTION OR CHANGE IN TYPE OR NATURE OF VISIT FOR MVA

Expert	Rating	Comments
1	+	Change in numbers for MV trauma over time
2	+	
4	+	
5	0	maybe
7	-	
8	0	could see an increase or decrease in less severe injuries
9	+	
12	dk	changes could be due to many causes
13	+	but sensitive to reporting customs
18	+	Add MVA to indicator name
19	0	need to specify occupants of vehicle
25	0	
26	+	
27	+	
28	+	
29	+	Assumes baseline data (before and after comparisons)
30	dk	
31	+	
33	+	
35	+	
37	+	Assessing changing patterns/sensitivity of injury is important
38	+	how do you relate to belt use potential as proxy measure
Unknown	0/+	
Unknown	-	

Indicator: NUMBER OF CASES TREATED VERSUS NUMBER ADMITTED

Expert	Rating	Comments
1	NR	Look at percentage of admissions overtime
2	0	
4	-	
5	-	This ratio might be unchanged even if belt use increases greatly
7	0	
8	+	# admitted/total seen is a crude measure of severity
9	+	
12	dk	changes could be due to many causes
13	0	very sensitive to hospital, census, customs, billing practices
18	+	Add MVA to indicator name
19	+	need to specify occupants of vehicle
25	+	
26	+	
27	+	
28	0	
29	+	Assumes baseline data (before and after comparison)
30	+	
31	+	
33	0	This should be tested with existing data file: i.e., J. Barancik's
35	0	
37	dk	problem with conservative treatment of head injury
38	+	
Unknown	0/+	this is where the money is!
Unknown	-	

Indicator: AVERAGE VEHICLE OCCUPANT TREATMENT COSTS -- OVERALL AND BETWEEN THOSE ADMITTED AND THOSE RELEASED

Expert	Rating	Comments
1	-	cost data extremely difficult
2	-	
4	+	Useful if reliably broken down by belt use
5	0	maybe
7	+	
8	+	
9	-	
12	dk	changes could be due to many causes
13	-	very sensitive to hospital, census, customs, billing, practices
18	+	
19	+	better if belt use could be determined by examining victim for belt induced marks, bruises, burns
25	0	
26	+	
28	+	
27	+	
29	0	Treatment costs would have to be standardized across hospitals. Estimating cost without info on crash severity is incomplete data. Could be very powerful if the circumstances of crash were also known (e.g., seating position, DV, type of crash configuration etc.
30	0	severity of injury and cost of treatment may not be consistent
31	-	There may be no change in proportion of admissions & release and yet the law may have been effective in decreasing mortality
33	0	No better than measuring treatment cases vs. admissions
35	+	
37	+	emphasizes the importance of the word "cost" in the matter
38	-	do not see potential
Unknown	0/+	
Unknown	-	

Indicator: BLOOD TRANSFUSIONS/COMPONENT CONSUMPTION

Expert	Rating	Comments
1	-	no use
2	0	
4	dk	
5	-	probably not
7	-	
8	0	a measure of expended resources and perhaps a measure of injury severity
9	-	
12	dk	changes could be due to many causes
13	-	very sensitive to hospital, census, customs, billing, practices
18	-	
19	-	
25	-	
26	dk	
27	+	
28	-	too insensitive
29	dk	
30	dk	
31	-	some who would have died now stay alive and need blood transfusions
33	-	therapeutic technology is changing too rapidly
35	+	
37	dk	
38	-	do not see potential
Unknown	0/+	too many factors at work, much regional variation. AIDS has changed use dramatically
Unknown	-	

Indicator: HOSPITAL/INPATIENT ADMISSIONS: FREQUENCY/RATE

Expert	Rating	Comments
1	-	not in general
2	0	
4	no rating	Only if vehicle occupants can be identified and belt use known
5	dk	
7	0	
8	+	
9	+	
12	+	
13	-	
18	+	
19	-	
25	-	
26	+	
27	0	insurance companies have different criteria to allow for admission, so results may be confounded
28		-
29	+	Assumes baseline data & knowledge about belt use/non-use
30	+	
31	+	
33	+	
35	0	
37	+	cost/utilization driven measures are good
38	no rating	only if related to admission diagnosis
Unknown	0	
Unknown	0	

Indicator: HOSPITAL BED OCCUPANCY RATE/PERCENT

Expert	Rating	Comments
1	no rating	not in general
2	dk	
4	no rating	useful only if occupants and belt use info is known
5	+	maybe, MV related only
7	-	
8	-	
9	+	
12	+	
13	NR	
18	+	for MVA
19	no rating	
25	-	
26	-	
27	0	hospitals are continuously manipulating # acute vs. # skilled beds to qualify for economic & political pressures & incentives. This could be confusing
28	-	
29	+	Assumes baseline data & info about use & non-use of belt at time of crash
30	dk	
31	dk	see note attached
33	0	needs testing -? appropriate date file, all hospital admission rates are steadily decreasing
35	0	
37	+	cost/utilization driven measures are good
38	-	no use
Unknown	0	beware our expected shift in age groups may be a confounder
Unknown	-	

Indicator: NUMBER OF HOSPITAL BED-DAYS

Expert	Rating	Comments
1	no rating	
2	0	
4	no rating	useful only if occupants can be identified and belt use known
5	+	maybe, MV related only
7	-	
8	+	a measure of resource utilization & severity
9	-	
12	+	
13	-	
18	+	Add MVA to indicator name
19	no rating	
25	-	
26	-	
27	-	
28	-	
29	NR	
30	dk	
31	+	
33	0	
35	0	
37	no rating	cost/utilization driven measures are good
38	no rating	only if you can relate to MV induced trauma
Unknown	0	
Unknown	+	

Indicator: AVERAGE HOSPITAL BED-DAYS

Expert	Rating	Comments
1	no rating	
2	-	
4	no rating	
5	+	maybe, MV related only
7	-	
8	+	
9	-	
12	+	
13	-	
18	+	for MVA
19	+	occupants only
25	-	
26	-	
27	+	
28	-	
29	NR	
30	0	
31	dk	
33	0	
35	0	
37	no rating	cost/utilization measures on good
38	no rating	only if you can relate to MV induced trauma
Unknown	dk	
Unknown	+	

Indicator: FREQUENCY/PERCENT OF CASES INVOLVING SURGICAL INTERVENTION

Expert	Rating	Comments
1	-	
2	dk	
4	no rating	
5	+	maybe, MV related only
7	-	
8	+	a measure of resource utilization & severity
9	-	what kind of "intervention"?
12	+	
13	-	a very awkward denominator
18	+	MVA
19	+	Identify occupants only
25	0	Probably not useful in isolation
26	+	for motor-vehicle related cases only
27	+	
28	-	
29	-	
30	dk	surgical intervention - severity of injury?
31	-	Doubt if this would be of value
33	0	Should be tested on Barancek data
35	0	
37	-	biased to minor cuts unless there is an injury severity threshold
38	-	
Unknown	0/+	
Unknown	+	

Indicator: MOTOR VEHICLE-RELATED ADMISSIONS

Expert	Rating	Comments
1	+	For these # of days/1CV days
2	+	
4	no rating	Only if occupants can be identified and belt use data known
5	+	maybe, MV related only
7	0	
8	+	needed to distinguish from other causes so that the other indications can be utilized & make sense
9	+	
12	+	
13	0	
18	+	
19	no rating	
25	0	Probably not useful in isolation
26	+	
27	+	
28	+	
29	NR	Isn't this the whole issue
30	+	
31	+	
33	+	
35	0	
37	-	Biased to minor/moderate severity accidents, which belt use may not affect
38	+	if you can collect, potentially related to "E" codes
Unknown	0/+	
Unknown	+	

Indicator: ABBREVIATED INJURY SCALE (AIS) CLASSIFICATION BY BODY REGION (SEE BELOW)

Expert	Rating	Comments
1	+	all injuries should be AIS coded
2	+	
4	+	
5	dk	might not change among those who arrive at hospital for treatment
7	0	
8	+	Will enable identification of change in injury patterns, e.g., perhaps less head injuries post law
9	+	
12	+	
13	+	
18	+	
19	+	
25	0	AIS may be useful but significant logistical problems exist with non-participating institutions
26	+	
27	+	
28	+	
29	+	Many hospitals already use AIS, which makes hospital injury data an excellent emerging standardized source of info.
30	dk	not familiar enough with any of these to assess relative usefulness, etc.
31	+	
33	+	will identify body areas at risk, requires trained coder, done only on a few institutions
35	+	
37	+	this type of data is vital
38	+	
Unknown	0/+	
Unknown	+	

Indicator: CLASSIFICATION BY INJURY SEVERITY AIS-1 TO AIS-6 (MINOR TO MAXIMUM)

Expert	Rating	Comments
1	+	
2	+	
4	+	
5	no rating	all of these questionable because based only on patients who show up at hospital. Those whom the belt help don't come in
7	0	
8	0	
9	+	
12	+	
13	+	
18	+	
19	+	
25	0	
26	+	
27	+	
28	+	
29	+	AIS being used by many hospitals - makes hospital injury data an excellent emerging source for standardized info
30	dk	not familiar enough with any of these to assess relative usefulness, etc.
31	+	
33	+	will permit establishment at bottom line & stratification, requires trained coder, done only on a few institutions
35	+	
37	+	this type of data is vital
38	+	
Unknown	0/+	
Unknown	+	

Indicator: ASSESSMENT OF MULTIPLE INJURIES: MAXIMUM AIS (MAIS) CODES

Expert	Rating	Comments
1	+	
2	+	
4	+	
5	no rating	all of these questionable because based only on patients who show up at hospital. Those whom the belt help don't come in
7	0	
8	dk	
9	+	
12	+	
13	+	
18	+	
19	+	
25	0	
26	+	
27	+	
28	+	
29	0	
30	dk	not familiar enough with any of these to assess relative usefulness, etc.
31	+	
33	+	Requires trained coder, done only on a few institutions
35	+	
37	+	this type of data is vital
38	+	
Unknown	0/+	
Unknown	+	

Indicator: INJURY SEVERITY SCORES (ISS)

Expert	Rating	Comments
1	+	
2	+	
4	+	
5	no rating	all of these questionable because based only on patients who show up at hospital. Those who the belt help don't come in
7	0	
8	+	
9	+	
12	+	
13	+	
18	+	
19	+	
25	+	
26	+	
27	+	
28	+	
29	+	
30	dk	believe that changes in injury severity and location of injuries are important indicators of MVL impact not familiar enough with any of these to assess relative usefulness etc.
33	+	Requires trained coder, done only on a few institutions
35	+	
37	+	this type of date is vital
38	+	
Unknown	0/+	
Unknown	-	

Indicator: PROBABILITY OF DEATH SCORE (PODS)

Expert	Rating	Comments
1	no rating	
2	0	
4	dk	
5	no rating	all of these questionable because based only on patients who show up at hospital. Those whom the belt help don't come in
7	0	
8	+	
9	dk	
12	+	
13	0	
18	+	
19	dk	
25	0	
26	dk	
27	+	
28	+	
29	-	
30	dk	not familiar enough with any of these to assess relative usefulness, etc.
31	+	
33	+	requires trained coder, done only on a few institutions
35	0	
37	-	this type of data is vital but in some ways "treatment" quality driven
38	+	
Unknown	0/+	
Unknown	-	

Indicator: MOTOR VEHICLE EXTERNAL (E) CODES

Expert	Rating	Comments
1	+	*E Codes Superior
2	0	
4	+	
5	+	maybe
7	+	
8	0	
9	+	
12	+	
13	0	
18	+	
19	+	
25	+	
26	dk	
27	+	
28	dk	
29	+	
30	dk	not familiar enough with any of these to assess relative usefulness, etc.
31	no rating	Might help in seeing that any drivers & passengers of cars entered into study, but better if exact seating position can be established and area of main impact to car
33	+	requires trained coder, done only on a few institutions - now available in N.Y. for hospital admissions
35	+	
37	+	this type of data is vital
38	+	
Unknown	0/+	needed on out patient visits
Unknown	+	

Indicator: NATURE OF DISEASE (N) CODES

Expert	Rating	Comments
1	no rating	
2	dk	
4	-	
5	dk	
7	+	
8	dk	
9	+	
12	+	
13	-	
18	+	
19	dk	
25	0	
26	dk	
27	+	
28	dk	
29	+	
30	dk	not familiar enough with any of these to assess relative usefulness, etc.
31	+	Though other systems of coding may be preferable, e.g., SNOMED
33	-	Not relevant. Requires trained coder done only on a few institutions
35	0	
37	+	this type of data vital
38	dk	
Unknown	dk	
Unknown	0	

Indicator: OCCUPANT-TO-OCCUPANT INJURIES

Expert	Rating	Comments
1	-	
2	dk	
4	-	
5	+	maybe
7	+	
8	dk	does this mean each index pt is referred to other car occupants (which serve as control)?
9	-	
12	+	
13	+	
18	+	
19	0	
25	0	
26	-	
27	+	
28	dk	
29	0	
30	dk	not familiar enough with any of these to assess relative usefulness, etc.
31	no rating	Suitable for small in-depth study not for mass statistics
33	dk	
35	0	
37	-	
38	NR	
Unknown	0/+	
Unknown	+	

Indicator: INTERNATIONAL CLASSIFICATION OF DISEASES (ICD - 9 CM) TO AIS 85 SCORES: CONVERSION TABLE (MACKENZIE ET AL 1986)

Expert	Rating	Comments
1	+	
2	dk	
4	dk	
5	dk	
7	dk	
8	+	certainly more available than AIS/ISS codes but some loss of accuracy
9	dk	
12	+	
13	0	
18	+	
19	dk	
25	+	
26	+	
27	+	
28	+	
29	-	
30	dk	not familiar enough with any of these to assess relative usefulness, etc.
31	dk	
33	0	1/3 of ICD's lack specificity. Needs testing
35	0	
37	+	
38	dk	
Unknown	0/+	
Unknown	-	

Indicator: AIS 85: CONDENSED CHART CLASSIFICATIONS CODES

Expert	Rating	Comments
1	no rating	
2	dk	
4	dk	
5	dk	
7	dk	
8	0	
9	dk	
12	+	
13	0	
18	+	
19	dk	
25	+	
26	dk	
27	+	
28	+	
29	-	
30	dk	not familiar enough with any of these to assess relative usefulness, etc.
31	dk	no personal experience
33	+	simplifies severity scaling
35	+	
37	no rating	
38	dk	
Unknown	0	how valid?
Unknown	-	

Indicator: GENERAL SHIFTS/CHANGES IN SEVERE/MODERATE/MINOR INJURY PATTERNS

Expert	Rating	Comments
1	+	
2	0	
4	+	This is a fundamental type of analysis
5	+	Yes, by all means, if from an unbiased source like reports of all MV crashes
7	+	
8	+	How do you obtain this?
9	-	
12	+	
13	0	
18	+	Add MVA to indicator name
19	+	
25	+	
26	+	
27	+	
28	+	
29	+	
30	+	good indicator if injury classifications are reliable
31	+	
33	+	requires severity scaling
35	+	
37	-	better done w/AIS
38	+	
Unknown	0/+	
Unknown	+	

Indicator: SKIN (INCLUDES ABRASIONS, CONTUSIONS, LACERATIONS)

Expert	Rating	Comments
1	no rating	see note attached
2	dk	
4	+	some information about types of injury and body regions is helpful. Excessive clinical detail is not productive, however legislators & drivers are more interested in how many people will not be injured rather than the precise injury reduction
5	-	
7	0/+	
8	-	
9	-	
12	+	
13	0	
18	-	
19	0	could check injury victim for signs of having been belted during accident
25	+	"seat belt" sign especially helpful for confirmation
26	+	
27	+	
28	-	
29	NR	
30	dk	
31	+	
33	-	not recorded uniformly
35	+	
37	-	
38	+	potential if can show correlation - use/non-use
Unknown	0/+	"air bag" brush burn will increase but will need to be extracted from out-patient data sources
Unknown	+	

Indicator: BURNS

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	-	
7	0	
8	-	I think we'd be looking for changes (pre & post belt law) in injuries that have, immediate life threatening consequences or long term disabilities
9	-	
12	+	
13	-	
18	-	
19	0	
25	-	
26	-	
27	0	
28	-	
29	NR	
30	dk	
31	+	
33	-	frequency too low
35	0	
37	-	
38	-	do not think so
Unknown	dk	
Unknown	-	

Indicator: CRANIUM (INCLUDES FRACTURES)

Expert	Rating	Comments
1	no rating	
2	dk	it is unclear to me how location of injury would be a good predictor at seat belt usage alone (i.e., type of accident)
4	no rating	
5	+	
7	0	
8	-	
9	+	
12	+	
13	+	
18	+	
19	+	
25	+	
26	+	
27	+	
28	+	
29	NR	
30	0	
31	+	
33	+	probably
35	+	
37	+	Too few data annual & biased to very severe crashes leads to costs
38	+	potential if can show correlation use/non-use
Unknown	0	
Unknown	+	

Indicator: BRAIN INJURIES: COMA (GLASGOW SCALE) AMNESIA 3RD/4TH COLLISIONS OTHER MAJOR INJURIES

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	+	
7	0	
8	+	
9	+	
12	+	
13	+	
18	+	
19	+	
25	+	
26	+	
27	+	
28	+	
29	NR	
30	0	
31	+	maybe difficult to get widespread accurate data. HAIS Available
33	+	probably
35	+	
37	+	too few data annual & biased to very severe crashes leads to costs
38	+	potential if can show correlation - use/non-use unclear
Unknown	0/+	
Unknown	+	

Indicator: FACE TISSUE/WHOLE AREA

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	no rating	should decline
7	0	
8	0	
9	+	
12	+	
13	0	
18	-	
19	+	
25	+	studied at UT medical ctr - knoxville & presented Jan '89 (copy attached & abstract)
26	+	
27	+	
28	+	
29	NR	
30	dk	
31	+	
33	0	
35	+	
37	-	
38	no rating	
Unknown	0/+	face steering wheel contacts important here
Unknown	+	

Indicator: FACIAL BONE/CRANIUM SEPARATIONS

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	no rating	should decline
7	0	
8	+	
9	+	
12	+	
13	0	
18	+	
19	+	
25	+	studied at UT Medical Ctr - Knoxville & presented Jan '89 copy attached & abstract
26	+	
27	+	
28	+	
29	NR	
30	dk	
31	+	
33	0	
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: EYE: EYE INJURIES (GENERAL)

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	no rating	should decline
7	0	
8	+	
9	+	
12	+	
13	0	
18	+	
19	+	
25	-	
26	dk	
27	+	
28	0	
29	NR	
30	dk	
31	+	
33	0	
35	+	
37	-	
38	no rating	
Unknown	0	
Unknown	+	

Indicator: PENETRATING EYE INJURIES

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	no rating	should decline
7	0	
8	+	
9	+	
12	+	
13	0	
18	+	
19	0	
25	-	
26	dk	
27	+	
28	0	
29	NR	
30	dk	
31	+	
33	0	
35	+	
37	-	
38	no rating	
Unknown	dk	
Unknown	+	

Indicator: PARTIAL/PERMANENT LOSS OF VISUAL ACULTY

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	no rating	should decline
7	0	
8	+	
9	-	
12	+	
13	-	
18	+	
19	0	
25	-	
26	-	
27	+	
28	0	
29	NR	
30	dk	
31	+	
33	0	look at linked police accident reports - hospital adm. records in Great Britain, possibly New York state, new legally blind pattern
35	0	
37	-	
38	no rating	
Unknown	dk	
Unknown	-	

Indicator: EAR (INCLUDING INNER ORGANS)

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	no rating	
7	0	
8	0	
9	-	
12	+	
13	-	
18	+	
19	0	
25	dk	
27	+	
28	0	
29	NR	
30	dk	
31	+	
33	-	poorly reported
35	0	
37	-	
38	no rating	
Unknown	0	
Unknown	0	

Indicator: MOUTH: FRACTURED MANDIBLE

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	no rating	should decline
7	0	
8	+	
9	-	
12	+	
13	-	
18	+	
19	+	
25	+	studied at UT Medical Ctr -Knoxville & presented Jan '89 copy attached & abstract
26	+	
27	+	
28	+	
29	NR	
30	dk	
31	+	
33	0	
35	+	
37	-	
38	no rating	
Unknown	dk	
Unknown	+	

Indicator: TYPE/NATURE OF DENTAL REPAIRS

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	no rating	should decline
7	0	
8	0	
9	+	
12	+	
13	0	
18	+	
19	+	
25	+	
26	+	
27	+	
28	0	
29	NR	
30	dk	
31	+	availability
33	-	poorly reported
35	+	
37	-	
38	no rating	
Unknown	dk	
Unknown	0	

Indicator: NECK (INCLUDES WHIPLASH)

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	no rating	
7	+	
8	0	
9	+	
12	+	
13	-	
18	+	
19	0	
25	+	
26	-	
27	+	
28	+	
29	NR	
30	dk	
31	+	
33	-	no bottom line
35	+	
37	no rating	whiplash-no/quadriplegia-ok
38	no rating	
Unknown	0/+	big shift toward soft tissue injury expected as consequence of SBUL
Unknown	+	

Indicator: THROAT

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	no rating	
7	0	
8	+	
9	-	
12	+	
13	-	
18	-	
19	+	
25	-	
26	-	
27	+	
28	0	
29	NR	
30	dk	
31	+	
33	-	too infrequent
35	0	
37	-	
38	no rating	
Unknown	0/+	big shift toward soft tissue injury expected as consequence of SBUL
Unknown	+	

Indicator: BELT-INDUCED INJURIES

Expert	Rating	Comments
1	no rating	
2	+	
4	no rating	
5	+	sure, but how can one tell?
7	+	
8	+	
9	+	
12	+	
13	+	
18	+	
19	+	
25	+	
26	+	
27	+	
28	+	
29	NR	
30	dk	
31	-	preferable to specify and document injuries and afterwards attempt to assess the role of the belt in the causation of some
33	+	combination based on clavicle force and sternum and ribs - require police accident report
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: CHEST ORGAN INJURIES (HEART/LUNG)

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	dk	
7	0	
8	+	
9	+	
12	+	
13	0	
18	-	
19	+	
25	+	
26	+	
27	+	
28	+	
29	NR	
30	dk	
31	+	
33	-	
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: CHEST WALL

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	dk	
7	0	
8	+	
9	+	
12	+	
13	0	
18	-	
19	0	
25	+	
26	+	
27	+	
28	+	
29	NR	
30	dk	
31	+	
33	-	
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: BRUISED/FRACTURED STERNUM

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	+	
7	0	
8	+	
9	+	
12	+	
13	+	
18	+	
19	0	
25	+	
26	+	
27	+	
28	+	
29	NR	
30	dk	
31	+	would be better as fractured sternum bruising to be entered as bruised chest wall
33	+	see note attached
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: BRUISED/FRACTURED RIBS

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	+	
7	0	
8	+	
9	+	
12	+	
13	+	
18	+	
19	+	
25	no rating	
26	+	
27	+	
28	+	
29	NR	
30	dk	
31	+	fractured ribs - bruising - chest wall. Ideally one would want the exact ribs broken, i.e., whether L or R and which ribs
33	+	see note attached
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: ABDOMEN (INCLUDES KIDNEYS, SPLEEN AND LIVER)

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	+	
7	+	
8	+	
9	+	
12	+	
13	0	
18	-	
19	+	
25	+	
26	dk	
27	+	
28	0	
29	NR	
30	dk	
31	+	
33	+	"lap belt injury" cross abdomen...see note attached - injuries not unique to safety belt(SB) use
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: PELVIC ORGANS

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	+	
7	+	
8	+	
9	+	
12	+	
13	0	
18	-	
19	+	
25	-	
26	dk	
27	+	
28	0	
29	NR	
30	dk	
31	+	
33	-	
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: CERVICAL SPINE

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	+	yes, might respond but in which direction? Will increased belt use increase or decrease than?
7	0	
8	+	
9	+	
12	+	
13	0	
18	+	
19	+	
25	+	
26	dk	
27	+	the resultant redistribution of injuries according to AIS85 will show increased percentage when belted vs. unbelted, but AIS score less in belted
28	+	
29	NR	
30	dk	
31	+	damage to skeleton and no spinal cord needs to be identified
33	+	I think but am not certain about relation- ship to SB use
35	+	
37	-	
38	no rating	
Unknown	0/+	chance fractures & rear seat belted occupants
Unknown	+	

Indicator: THORACIC SPINE

Expert	Rating	Comments
1	no rating	
2	NR	
4	no rating	
5	+	response direction unknown
7	0	
8	+	
9	+	
12	+	
13	0	
18	+	
19	0	
25	+	
26	dk	
27	+	
28	+	
29	NR	
30	dk	
31	+	damage to skeleton and to spinal cord needs to be identified
33	+	
35	+	
37	-	
38	no rating	
Unknown	0/+	chance fractures & rear seat belted occupants
Unknown	+	

Indicator: LUMBAR SPINE

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	+	response direction unknown
7	0	
8	+	
9	+	
12	+	
13	0	
18	+	
19	0	
25	+	
26	dk	
27	+	
28	+	
29	NR	
30	dk	
31	+	damage to skeleton and to spinal cord needs to be identified
33	+	
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: UPPER EXTREMITIES

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	dk	
7	0	
8	+	
9	+	
12	+	
13	0	
18	-	
19	-	
25	-	
26	dk	
27	+	
28	0	
29	NR	
30	dk	
31	+	Laterality is valuable as well as specific bones, joints, etc.
33	-	
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: LOWER EXTREMITIES

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	dk	
7	0	
8	+	
9	+	
12	+	
13	0	
18	-	
19	+	
25	+	
26	dk	
27	+	
28	0	
29	NR	
30	dk	
31	+	
33	+	useful if scaled for severity
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: PELVIS

Expert	Rating	Comments
1	no rating	
2	dk	
4	no rating	
5	dk	
7	0	
8	+	
9	+	
12	+	
13	0	
18	-	
19	-	
25	-	
26	dk	
27	+	
28	0	
29	NR	
30	dk	
31	+	
33	no rating	
35	+	
37	-	
38	no rating	
Unknown	0/+	
Unknown	+	

Indicator: EXPECTED VS. ACTUAL NUMBER OF INJURIES

Expert	Rating	Comments
1	+	
2	0	
4	+	vital
5	+	
7	+	
8	+	
9	+	
12	+	
13	+	
18	+	
19	0	how do you establish expected number
25	+	
26	+	
27	+	
28	+	
29	+	plus types restrained & unrestrained
30	+	by injury category (e.g., fatal, serious moderate, minor)
31	+	expected vs. actual number of deaths
33	dk	
35	+	
37	+	
38	+	
Unknown	0/+	
Unknown	+	

Indicator: NUMBER OF LIVES SAVES

Expert	Rating	Comments
1	no rating	
2	0	
4	+	
5	+	
7	+	
8	+	
9	-	
12	+	
13	dk	
18	+	
19	+	
25	+	
26	+	
27	+	
29	+	
30	0	
31	+	
33	+	limited by small numbers
35	+	
37	+	
38	+	
Unknown	0/+	
Unknown	+	

Indicator: NUMBER OF NONINJURY CRASHES

Expert	Rating	Comments
1	+	
2	+	
4	-	Counterintuitive: higher wearing rates should correct some injury accidents to non-injury accidents
5	0	doubtful
7	+	
8	+	
9	+	
12	+	
13	NR	
18	-	
19	-	
25	+	
26	+	
27	+	
28	+	
29	+	Fundamental info. that nobody seems to have. Major difficulty would be in establishing baseline
30	+	as proportion of all crashes
31	dk	
33	+	non-uniform reporting
37	-	
38	+	
Unknown	0/+	
Unknown	+	

Indicator: MEMBERSHIP CHANGES IN ORGANIZATION SERVING PEOPLE DISABLED BY CRASH INJURIES

Expert	Rating	Comments
1	-	use hospital discharge data
2	0	
4	-	
5	-	too general, too small, too unsensitive
7	-	
8	0	
9	-	
12	0,dk	changes could be due to many causes
13	0	
18	-	
19	+	need to identify occupants as opposed to motorcyclists
25	-	
26	-	
27	0	wide variability in local public awareness, financing, and social pressure
28	-	see note attached
29	-	
30	-	change in number of accidents, regardless of MVL, effect these indicators
31	dk	
33	-	too late to be useful takes 1 to 3 years
35	0	
37	-	
38	0	
Unknown	dk	
Unknown	0	

Indicator: SALES VOLUME OF ADAPTIVE DEVICES FOR VEHICLES OF DISABLED PERSONS

Expert	Rating	Comments
1	-	E coding critical
2	0	
4	-	
5	-	too small, general & insensitive
7	-	
8	0	
9	dk	
12	0, dk	changes could be due to many causes
13	-	
18	-	
19	-	
25	0	
26	-	marketing and affordability variable confounding
28	-	too insensitive
29	-	
30	-	
31	dk	
33	-	too late to useful takes 1 to 3 years
35	0	
37	-	
38	-	
Unknown	0	
Unknown	0	

Indicator: TREATMENT COST OF REHABILITATION

Expert	Rating	Comments
1	+	
2	0	
4	+	of interest if adequate data are available
5	-	too insensitive general
7	0	
8	+	tough to get
9	dk	
12	0	changes could be due to many causes
13	0	
18	+	
19	-	
25	0	
26	+	
27	+	
28	0	too insensitive
29	0	
30	-	
31	dk	
33	0	
35	0	
37	no rating	total cost ok
38	-	
Unknown	0/+	
Unknown	+	

Indicator: INCIDENCE OF SECONDARY CONSEQUENCE FOR EXAMPLE: CRASH-RELATED EPILEPSY POST BLOOD TRANSFUSION HEPATITIS PAIN - KILLER ADDICTIONS

Expert	Rating	Comments
1	no rating	very difficult - questionable reliability
2	0	
4	-	
5	-	too insensitive
7	-	
8	0	
9	-	
12	0	changes could be due to many causes
13	0	
18	-	
19	-	
25	-	
26	0	
27	+	
28	-	too insensitive
29	-	
30	-	
31	dk	
33	-	not uniformly reported
35	0	
37	-	
38	-	
Unknown	0/+	
Unknown	0	

Indicator: FREQUENCY/PERCENT INSURANCE COLLISION INJURY CLAIMS

Expert	Rating	Comments
1	0	
2	0	
4	+	useful to counter risk compensation' claims of greater driver security leading to riskier driving and more accidents
5	+	maybe
7	+	
8	+	
9	+	
12	+	
13	+	
18	-	
19	-	
25	+	
26	+	
27	+	
28	+	
29	NR	
30	+	
31	+	
33	dk	
35	0	
37	+	
38	+	
Unknown	0/+	
Unknown	+	

Indicator: **SAFETY BELT REPLACEMENT CLAIMS/PAID CASES**

Expert	Rating	Comments
1	-	
2	0	
4	-	
5	0	
7	+	
8	dk	
9	dk	
12	0, dk	
13	+	
18	-	
19	-	
25	0	very limited use, if any
26	+	
27	0	
28	-	
29	NR	
30	dk	
31	dk	
33	dk	
35	0	
37	-	
38	-	
Unknown	dk	
Unknown	+	

Indicator: WINDSHIELD REPLACEMENT/DAMAGE CLAIMS

Expert	Rating	Comments
1	-	
2	0	
4	-	
5	-	probably not; most vs. damage probably not occupant caused
7	0	
8	0	
9	+	
12	0, dk	
13	+	
18	-	
19	-	
25	0	
26	+	
27	+	
28	-	
29	NR	
30	-	
31	dk	
33	dk	aren't most windshields broken by flying rocks
35	0	
37	-	
38	+	
Unknown	dk	
Unknown	+	

Indicator: INCREASED NUMBER OF CASES

Expert	Rating	Comments
1	-	
2	+	
4	dk	
5	+	yes
7	+	
8	-	
9	dk	don't understand this
12	+	
13	-	
18	-	
19	-	
25	-	
26	-	
27	0	reflects legal community aggressiveness more than belt uses
28	-	
29	NR	
30	0	
31	dk	sounds possible, but don't know enough about it
33	-	too many confounding factors
35	0	
37	-	
38	+	
Unknown	dk	
Unknown	+y	

Indicator: INJURY PATTERNS BY OCCUPANT COMPARTMENT PARTS (E.G., STEERING WHEEL, DASH)

Expert	Rating	Comments
1	0	
2	+	
4	0	
5	+	maybe
7	+	
8	+	
9	+	
12	dk	
13	0	
18	+	
19	-	
25	0	
26	-	
27	+	
28	-	
29	NR	
30	0	
31	dk	
33	-	data source?
35	+	
37	-	
38	+	
Unknown	0/+	
Unknown	+	

INDICATOR INDEX

PART C

INDICATOR CATALOG

[See page C-53 for an index of indicators included in Part C.]

indicator	ejections
indicator desc.	number or rate of persons thrown or partially thrown from the vehicle through windows or door or other openings due to forces of a crash as reported by police or other on-site data collection
reviewer	Landes/Miller
validity	medium
v-associated	yes, consistently shown that significantly fewer ejections among belted occupants
v-causally	questionable
v-temporally	questionable
v-other factors	yes
v-which others	direction of impact, seating position, improved vehicle and windshield design, possibly airbags
v-how influenced	higher incidence of ejection of unbelted occupants in rollovers and lateral impact. one study suggested unbelted rear occupants more prone to ejection.
v-compensated for	match for direction of impact or watch impact direction mix and vehicle design for substantial changes
objectivity	high
o-phys. evidence	yes, so called "partial ejections", however, become more subjective
usefulness	high
u-legislators	yes, correlated with fatalities and severe injuries
u-positive	yes, fewer fatalities, less severe injuries when not ejected
u-negative	no
u-tabulated	yes, generally ejection information is noted in an accident report; if not specific item, then part of narrative.
sensitivity	low
s-how much change	although highly related to belt use, change in usage rates because of laws among those especially at risk of ejection may be low
generalizability	medium
g-valid generaliz.	ejection situations may not be typical
feasibility	medium
f-data collection	yes, defined fairly easily but relies on police or onsite data collection
f-special knowledge	only in cases of "partial ejection". need criteria to establish exactly what this is.
comments	

indicator	neurosurgical consultation (post motor-vehicle crash)
indicator desc.	ratios of belted vs. nonbelted so that values less than unity (<1) suggest a desirable effect of seat belt use
reviewer	Race
validity	high
v-associated	belted occupants associated with statistically significant fewer cases required consultation
v-causally	yes
v-temporally	not known
v-other factors	assumes one knows belt use and nonuse
v-which others	assumes accuracy between belt use and nonuse cases
v-how influenced	
v-compensated for	
objectivity	high
o-phys. evidence	
usefulness	high
u-legislators	
u-positive	yes
u-negative	no
u-tabulated	not known
sensitivity	high
s-how much change	not known
generalizability	high
g-valid generaliz.	yes
feasibility	high
f-data collection	
f-special knowledge	required detailed medical service information
comments	

indicator	surgical operations (post motor-vehicle crash)
indicator desc.	ratio of belted vs. nonbelted cases so that values less than unity (<1) suggest a desirable effect of safety belt use
reviewer	Race
validity	high
v-associated	belted occupants were associated with statistically significant fewer cases requiring post-crash surgery
v-causally	yes
v-temporally	doesn't need to be to be useful
v-other factors	assumes one knows. have accurately identified
v-which others	belt use/nonuse cases
v-how influenced	
v-compensated for	
objectivity	high
o-phys. evidence	
usefulness	high
u-legislators	
u-positive	yes
u-negative	
u-tabulated	
sensitivity	high
s-how much change	
generalizability	high
g-valid generaliz.	
feasibility	high
f-data collection	
f-special knowledge	
comments	

indicator	all head injuries to front seat occupants, excluding drivers with severity > AIS 2
indicator desc.	
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	interior design (steering wheel, airbags, types of impact)
v-how influenced	improved design may lessen head injuries and severity
v-compensated for	need to periodically compare statistics for seat belt users and nonusers
objectivity	high
o-phys. evidence	yes
usefulness	high
u-legislators	yes, life-threatening injuries, disabilities
u-positive	yes, significant reduction with seat belt usage, 50 % or more
u-negative	
u-tabulated	widely available
sensitivity	high
s-how much change	up to 7 fold reduction with safety belt usage
generalizability	high
g-valid generaliz.	yes
feasibility	high
f-data collection	yes
f-special knowledge	physicians, nurses, medical records clerks
comments	includes all head injuries in front seat passengers, and also injuries < AIS 3 in drivers. This will show benefits that are masked by steering wheel injuries or other factors that seem to increase severe head injuries in drivers despite seat belt use.

indicator	face injuries
indicator desc.	all injuries to face, AIS > 1, excludes eye.
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	steering wheel design, airbags, position in vehicle (driver or front seat passenger)
v-how influenced	steering wheel poses high risk for belted driver
v-compensated for	tabulate passengers separately from drivers. periodic controls of belted versus unbelted.
objectivity	high
o-phys. evidence	
usefulness	high
u-legislators	most common injury, cosmetic effects important
u-positive	yes
u-negative	
u-tabulated	yes
sensitivity	medium
s-how much change	studies on facial fractures show minimal improvement. overall face injuries show marked improvement.
generalizability	high
g-valid generaliz.	
feasibility	high
f-data collection	
f-special knowledge	medical clerk
comments	

indicator	upper extremities
indicator desc.	injuries to upper arm and forearm, AIS > 1. does not include hand or wrist
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	seating position -- driver or passenger
v-how influenced	unrestrained passengers seem to be more at risk, therefore show more improvement with law
v-compensated for	can restrict indicator to front seat passengers
objectivity	medium
o-phys. evidence	reports differ as to what constitutes upper extremity
usefulness	medium
u-legislators	usually results in temporary disability
u-positive	yes
u-negative	
u-tabulated	useful in some data bases, others not well defined
sensitivity	medium
s-how much change	not all studies show significant change
generalizability	high
g-valid generaliz.	with proper definition
feasibility	high
f-data collection	
f-special knowledge	medical clerk
comments	reports vary in precision of "arm" or "upper extremity" definition and also in types of injury tabulated as fracture, soft tissue, etc. It appears that with precise definition, belt use laws and belt use will be reflected by improvement in this indicator.

indicator	lower extremities
indicator desc.	lower extremity injuries, AIS > 1, excluding ankles and feet
reviewer	Benjamin
validity	medium
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	unclear
v-which others	
v-how influenced	
v-compensated for	
objectivity	high
o-phys. evidence	
usefulness	medium
u-legislators	will include some permanent disability
u-positive	equivocable
u-negative	
u-tabulated	poor definition
sensitivity	low
s-how much change	many studies show no change
generalizability	
g-valid generaliz.	
feasibility	high
f-data collection	
f-special knowledge	medical clerk
comments	literature does not give strong support for this indicator.

indicator	Abbreviated Injury Scale (AIS)
indicator desc.	includes MAIS, ISS. frequency or percent of AIS cases. injury classification system that when fully used describes the injury by body part, type and severity.
reviewer	Race
validity	high
v-associated	yes
v-causally	yes
v-temporally	
v-other factors	yes
v-which others	
v-how influenced	
v-compensated for	assessment made without knowledge of belt use
objectivity	high
o-phys. evidence	standardize procedure. approximately "universal" usage
usefulness	high
u-legislators	yes
u-positive	yes
u-negative	
u-tabulated	very common in medical literature
sensitivity	
s-how much change	
generalizability	high
g-valid generaliz.	
feasibility	high
f-data collection	yes
f-special knowledge	requires AIS knowledge. data file may already be coded
comments	this is a classification system. it is used to describe the nature and severity of motor-vehicle related trauma. it is a means to an end and not an indicator per se. good as a classification of the life-threatening nature of injuries but not disability, rehabilitation or duration of injury consequence.

indicator	frequency/per cent of multiple injury cases
indicator desc.	generally used when assessing injury patterns or the effect of belts or laws on same. may have potential as a way of identifying motor-vehicle related injury cases
reviewer	Race
validity	high
v-associated	
v-causally	yes
v-temporally	depends on data base
v-other factors	yes
v-which others	injuries due to vehicle deformation, steering wheel, dashboard, door pillars (B)
v-how influenced	
v-compensated for	improved vehicle design. maintain the integrity of the occupant compartment
objectivity	high
o-phys. evidence	
usefulness	high
u-legislators	
u-positive	yes
u-negative	
u-tabulated	
sensitivity	
s-how much change	
generalizability	high
g-valid generaliz.	
feasibility	high
f-data collection	
f-special knowledge	
comments	

indicator	general shifts in frequency of injury cases or distribution by severity
indicator desc.	strong evidence in European literature that belts reduce the number of injuries and the severity of injury
reviewer	Race/Hoskin
validity	high
v-associated	yes
v-causally	yes
v-temporally	depends on available data base
v-other factors	yes
v-which others	vehicle deformation
v-how influenced	occupants collide with vehicle interior because of crushing of compartment
v-compensated for	improved vehicle design, information on vehicle itself determining change in velocity
objectivity	high
o-phys. evidence	yes
usefulness	high
u-legislators	yes
u-positive	yes
u-negative	sometimes studies report an increase in minor injuries
u-tabulated	depends on record keeping system
sensitivity	medium
s-how much change	not known
generalizability	high
g-valid generaliz.	depends on scope of record keeping system
feasibility	high
f-data collection	usually through trauma registry; can use police reports.
f-special knowledge	medical, unless already coded
comments	

indicator	head injuries, excluding ear, eye, and face
indicator desc.	cranium injuries, anatomic lesions, and non-anatomic (concussive) injuries
reviewer	Benjamin/Planek
validity	high
v-associated	yes, head injuries due to occupant ejections and projection into the windshield, etc., should be prevented by belts so that frequency and severity are reduced
v-causally	yes, observed differences in head injury frequency, severity, and patterns among belted and unbelted occupants are robust enough to appear in belt law research
v-temporally	it can be, but records must be available, preferably including uniform severity code as well as victim seating position
v-other factors	yes
v-which others	severity of impact (delta V), angle of collision, seating position, changes in interior car design, introduction of airbags, raising of 55 mph speed limit
v-how influenced	changes in one or a combination of these variables in post vs. pre-belt law periods can increase or dampen the effects
v-compensated for	use comparison groups, check experience of belt users and non-users periodically
objectivity	high
o-phys. evidence	yes, but training in AIS coding, etc., would be necessary
usefulness	high
u-legislators	yes, it should be. head injuries are life-threatening and can cause major disability and are potentially high cost medical problems
u-positive	yes, reductions in the neighborhood of 50 % or more
u-negative	belted driver injury due to steering wheel contact at high impacts could produce some negative results
u-tabulated	yes, head injury data usually available in hospital records but storage and uniformity of data are questionable
sensitivity	high
s-how much change	questionable. some indication that nonbelt wearers more likely in crashes. even so, sensitivity should be high, especially if limited to drivers and front pass. AIS <= 2.
generalizability	high
g-valid generaliz.	yes, providing the study sample is statistically representative
feasibility	medium
f-data collection	yes, but training necessary to use AIS coding
f-special knowledge	yes, physicians, nurses, medical records clerk
comments	

indicator	ratio of head injuries to cervical sprain or whiplash
indicator desc.	all head injuries, injuires to neck designated as strain, sprain, or whiplash
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	head rests
v-how influenced	head rests offer protection against cervical sprain
v-compensated for	periodic study of belted versus nonbelted
objectivity	medium
o-phys. evidence	cervical sprain diagnosed by symptoms which may be delayed
usefulness	high
u-legislators	represents head injuries saved
u-positive	yes
u-negative	not as defined
u-tabulated	yes
sensitivity	high
s-how much change	even with probable underreporting of cervical strain, reports give high improvement for index
generalizability	high
g-valid generaliz.	
feasibility	high
f-data collection	
f-special knowledge	medical clerk
comments	Three-point restraints protect head against impact by transferring stress to neck. Neck structures at risk are ligaments and muscles rather than central nervous system, as is the case with head injuries.

indicator	lung injuries
indicator desc.	hemothorax, pneumothorax, pulmonary contusions (x-ray diagnosis)
reviewer	*Benjamin*
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	interior design, steering wheel, dashes, clothing, seating position
v-how influenced	new design should reduce incidence
v-compensated for	periodic comparisons of seat belt use and non-seat belt use statistics
objectivity	high
o-phys. evidence	yes, x-ray
usefulness	high
u-legislators	yes, life threatening
u-positive	yes
u-negative	
u-tabulated	yes
sensitivity	high
s-how much change	significant changes with seat belt laws
generalizability	medium
g-valid generaliz.	total incidence low
feasibility	high
f-data collection	yes, x-ray criteria
f-special knowledge	medical
comments	could be useful indicator. need large accident base because of low incidence

indicator	treatment cost of rehabilitation (spinal cord injuries)
indicator desc.	average annual cost (or projected total cost) of spinal cord injury incurred with and without safety belt
reviewer	Hoskin
validity	high
v-associated	yes
v-causally	yes, provided that medical record includes E-code or equivalent
v-temporally	yes, depending on data source
v-other factors	yes
v-which others	crash configuration, vehicle body style, presence of degenerative bone disease, etc.
v-how influenced	can increase severity of injury in spite of seat belt use
v-compensated for	if confounding factors are included in medical/rehab record, then they can be controlled statistically
objectivity	high
o-phys. evidence	yes, costs recorded in medical/rehab files
usefulness	high
u-legislators	yes, much of rehab cost comes from public funds
u-positive	no
u-negative	yes
u-tabulated	no
sensitivity	medium
s-how much change	probably moderately sensitive if adjusted for inflation
generalizability	high
g-valid generaliz.	spinal cord injury rehab costs are probably similar nationwide
feasibility	high
f-data collection	yes, easily
f-special knowledge	no, only examination of existing records
comments	document #45 was prime source. similar spinal cord registries could obtain similar data

indicator	motor-vehicle related admissions
indicator desc.	
reviewer	Fearn
validity	medium
v-associated	yes
v-causally	no
v-temporally	yes
v-other factors	yes
v-which others	traffic density, general trends in other use groups, admissions policy
v-how influenced	they also influence injury severity and thus number of admissions
v-compensated for	collect data on other factors, compare direction and magnitude with vehicle occupant data
objectivity	high
o-phys. evidence	yes, hospital records
usefulness	high
u-legislators	yes
u-positive	yes
u-negative	
u-tabulated	yes
sensitivity	high
s-how much change	probably not too much. some studies indicate an admission rate 3.5 times higher for unbelted than belted
generalizability	
g-valid generaliz.	
feasibility	high
f-data collection	yes
f-special knowledge	no
comments	

indicator	spinal cord injury
indicator desc.	all spinal cord injuries resulting in permanent neurologic impairment
reviewer	Benjamin
validity	medium
v-associated	although belts protect against ejection and compartment impact, they directly stress the spine, especially the neck
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	compartment design, EMS handling
v-how influenced	trend to improvement independent of belt use laws
v-compensated for	periodic controls of belted versus unbelted
objectivity	high
o-phys. evidence	
usefulness	high
u-legislators	
u-positive	yes
u-negative	
u-tabulated	no, spinal cord registries do not give belt use or crash data. difficult to relate to individual state belt laws
sensitivity	low
s-how much change	incidence of cases very low
generalizability	low
g-valid generaliz.	no
feasibility	medium
f-data collection	present spinal registry center not interested
f-special knowledge	medical clerk
comments	subject of special registry. high legislative impact.

indicator	fractured sternum
indicator desc.	fracture of sternum by x-ray. bruised sternum, not well defined diagnosis
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	interior design, steering wheel, protuberances, clothing, position
v-how influenced	trend is to diminish
v-compensated for	compare seat belt use and non-use statistics periodically
objectivity	
o-phys. evidence	need x-ray, unlikely to be reported without x-ray
usefulness	medium
u-legislators	yes
u-positive	direct effect of seat belt restraint, reciprocal of more serious injuries
u-negative	definite increase in sternal injury with seat belt
u-tabulated	yes
sensitivity	high
s-how much change	100% to 150% increase
generalizability	high
g-valid generaliz.	yes
feasibility	high
f-data collection	yes
f-special knowledge	medical
comments	very useful for gauging compliance. not good argument for legislation.

indicator	number treated vs. number admitted
indicator desc.	number (proportion or percentage) of MV accident victims treated vs. admitted
reviewer	Fearn
validity	medium
v-associated	yes
v-causally	no
v-temporally	yes
v-other factors	yes
v-which others	any factor affecting crash severity: traffic density, vehicle miles, no. of vehicles, average speeds, changes in speed laws, crash config., varying admissions policies (HMO)
v-how influenced	they could change the balance of those just treated vs. those admitted
v-compensated for	careful selection of study population; examination of trends in other road user groups
objectivity	high
o-phys. evidence	yes
usefulness	high
u-legislators	yes, indicator of less demand for medical services, i.e. less severe injuries
u-positive	yes
u-negative	
u-tabulated	yes
sensitivity	medium
s-how much change	moderate increases in belt use appear to produce significant changes in the indicator.
generalizability	high
g-valid generaliz.	yes
feasibility	high
f-data collection	yes
f-special knowledge	no
comments	

indicator	average medical treatment costs
indicator desc.	acute care costs for safety belt use vs. nonuse, and admitted vs. treated and released
reviewer	Hoskin
validity	high
v-associated	yes
v-causally	yes, provided that medical record indicates motor-vehicle trauma
v-temporally	yes
v-other factors	yes
v-which others	seating position, speed, vehicle make/model/size, crash configuration, etc.
v-how influenced	can affect injury severity
v-compensated for	can be controlled statistically if the confounding variables are identified
objectivity	high
o-phys. evidence	yes, medical record information
usefulness	medium
u-legislators	yes, a portion of costs come from public funds (medicaid)
u-positive	no
u-negative	yes
u-tabulated	no, only through special studies
sensitivity	medium
s-how much change	due to confounding factors and inflation, not too sensitive
generalizability	high
g-valid generaliz.	yes
feasibility	high
f-data collection	yes, a set of cost elements could be agreed upon.
f-special knowledge	no, extracted from existing medical and accounting data.
comments	the number of confounding factors is the biggest drawback to this indicator.

indicator	penetrating eye injuries
indicator desc.	eyes injuries AIS > 1
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	shatter proof windshields, seat belts
v-how influenced	does not protect against flying glass
v-compensated for	periodic study of belted vs. nonbelted
objectivity	high
o-phys. evidence	yes
usefulness	high
u-legislators	yes, loss of vision
u-positive	yes
u-negative	
u-tabulated	yes
sensitivity	high
s-how much change	
generalizability	high
g-valid generaliz.	
feasibility	high
f-data collection	yes
f-special knowledge	medical clerk
comments	although incidence is relatively low, data can be collected from eye centers to give large enough number for significant results.

indicator	injury patterns by occupant compartment parts
indicator desc.	injuries due to contact with interior vehicle components
reviewer	Landes
validity	high
v-associated	yes, there are definite injury pattern differences between belted/unbelted (as well as driver/passenger)
v-causally	not a simple cause/effect. more of a shift in patterns or mix.
v-temporally	yes, in terms of injury "mix" changes
v-other factors	no
v-which others	
v-how influenced	
v-compensated for	
objectivity	medium
o-phys. evidence	yes, based on injuries themselves, or injuries and vehicle interior damage. need for judgement in many cases
usefulness	high
u-legislators	yes, both in terms of seat belt use and vehicle interior damage
u-positive	yes, decrease in certain injuries
u-negative	yes, also seat belt specific injuries
u-tabulated	not known, many sources
sensitivity	high
s-how much change	any change should produce corresponding change in injury data
generalizability	high
g-valid generaliz.	yes
feasibility	medium
f-data collection	yes
f-special knowledge	yes, knowledge of injury/vehicle part correspondence
comments	the indicator does not in itself appear to be a useful indicator. this is because injuries are generally enumerated first, and then inferences are made concerning the passenger compartment part responsible for the injury. (although not always stated outright, some studies appeared to combine injury information with vehicle interior damage to ascertain the vehicle part/injury type relationship). it seems that the best strategy may be to consider the vehicle part as a factor of certain injury types e.g. chest injuries/steering wheel. there are several fairly specific injury/vehicle part combinations that would be useful in seat belt use evaluation. several important ones noted in the literature are: chest/steering wheel, face/steering wheel, head/interior side or roof, shoulder or chest or pelvis or abdomen/restraint system, face/instrument panel, eye/windshield, face/auto glass, neck/seat belts, hip/dashboard. see original copy of indicator profile for references numbers of articles dealing with each combination.

indicator	passenger compartment damage
indicator desc.	damage to actual vehicle compartment components from occupant contact as an indicator of seat belt use
reviewer	Landes
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	direction of impact
v-how influenced	different occupant-compartment collisions result from different external collision directions
v-compensated for	analysis of external vehicle damage to ascertain direction of impact
objectivity	high
o-phys. evidence	yes, interior compartment damage
usefulness	medium
u-legislators	only indirectly
u-positive	yes
u-negative	no
u-tabulated	no
sensitivity	high
s-how much change	any change in belt use would produce obvious changes
generalizability	high
g-valid generaliz.	yes, with seat belt use
feasibility	medium
f-data collection	yes
f-special knowledge	yes, knowledge of occupant-compartment injury patterns
comments	while reviewing the literature covering vehicle parts for the indicator "injury patterns by occupant compartment parts", it became apparent that passenger compartment damage may be a useful indicator of seat belt use. none of the literature reviewed enumerated indicents of interior vehicle damage. rather, the injuries were used as evidence to deduce the component of the vehicle with which the body contact was made. in some cases, the injury information was compared with observed passenger compartment damage to establish the area of body contact. it seems that an examination of the vehicle passenger compartment alone would permit valid conclusions concerning occupant seat belt use. consequently, although passenger compartment damage as an indicator in itself is not noted in the literature, it should be considered as a viable, potential indicator of seat belt use.

indicator	spinal fractures, sprains
indicator desc.	exclude cervical sprains, diagnosis by x-ray of symptoms
reviewer	Benjamin
validity	medium
v-associated	yes
v-causally	mechanisms obscure
v-temporally	yes
v-other factors	not known
v-which others	passenger-to-passenger interaction
v-how influenced	
v-compensated for	
objectivity	high
o-phys. evidence	symptoms, fairly well defined
usefulness	
u-legislators	yes
u-positive	no
u-negative	yes, sprains of low back up 100%-300%
u-tabulated	yes
sensitivity	high
s-how much change	sprains of low back up 100%-300% for front seat drivers
generalizability	medium
g-valid generaliz.	overall incidence low
feasibility	high
f-data collection	yes
f-special knowledge	medical
comments	strong negative indicator of low incidence. mechanisms not clear. may not be constant in various studies. poor indicator.

indicator	number/percent of cases transported by ambulance
indicator desc.	
reviewer	Fearn
validity	medium
v-associated	yes, increase in belt use should result in decrease in need for ambulance services
v-causally	no
v-temporally	yes
v-other factors	yes
v-which others	traffic conditions, seasonality, trends in ambulance runs for other road user groups
v-how influenced	could influence difference in number of runs over two observation periods, masking the true effect of the seat belt use law
v-compensated for	control data collection timing and sampling plan; collect data on other user groups
objectivity	high
o-phys. evidence	yes, although determination of belt use is often self-reported
usefulness	high
u-legislators'	yes, it's a gauge of seat belt effectiveness and the demand for medical services
u-positive	yes, effect of seat belt in mitigating serious injury
u-negative	no
u-tabulated	unsure, the reviewed literature consisted of special studies, although number of runs may be routinely kept
sensitivity	medium
s-how much change	with belts about 50% effective in preventing the types of injuries which would require a run, it would appear only a moderate increase in use would produce a significant change.
generalizability	medium
g-valid generaliz.	yes, regarding general demand for services of belted vs. nonbelted occupants
feasibility	high
f-data collection	yes
f-special knowledge	no
comments	Dagnone and Siu (#61), derived two measures to look at all facets of the demand for medical services. They are the preventive rate and the population preventive rate, which assess the porportion of service utilization among the nonbelted which would be prevented if they used belts, and the amount of service utilization which would be prevented if belt use reached 100%, respectively.

indicator	number of emergency room visits
indicator desc.	number (or percent) of crash victims who receive ER treatment
reviewer	Fearn
validity	medium
v-associated	yes
v-causally	no
v-temporally	yes
v-other factors	yes
v-which others	could possibly be influenced by traffic conditions, traffic exposure, trends in other road user groups
v-how influenced	
v-compensated for	develop data collection strategies to permit valid before/after comparisons. compare expected vs. observed trends among various road user categories.
objectivity	high
o-phys. evidence	yes, documented emergency room treatment
usefulness	high
u-legislators	yes
u-positive	yes, reduction in need for treatment, i.e. less serious injury
u-negative	no
u-tabulated	yes
sensitivity	medium
s-how much change	evidence is scant, but it appears the increase in the indicator will be 1/3 to 1/2 that of the increase in belt use
generalizability	medium
g-valid generaliz.	yes, about general injury severity of belt wearers vs. nonwearers
feasibility	high
f-data collection	yes
f-special knowledge	no
comments	

indicator	injury type (MV crash related)
indicator desc.	most common: 1) complaint of pain, 2) bleeding, 3) contusions, 4)bruises and abrasions, 5) fractures and dislocations, 6) concussions
reviewer	Race
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes, should be attainable from state MV accident data
v-other factors	yes
v-which others	subject to MV accident variations
v-how influenced	
v-compensated for	compared to state without seat belt use law, for example
objectivity	medium
o-phys. evidence	not known who makes the assessment
usefulness	high
u-legislators	
u-positive	reduction in more serious injury types
u-negative	increase in less serious injury types, "complaint of pain"
u-tabulated	
sensitivity	medium
s-how much change	
generalizability	medium
g-valid generaliz.	
feasibility	high
f-data collection	yes
f-special knowledge	no
comments	

indicator	fracture of femur
indicator desc.	x-ray diagnosis
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	interior design, impact absorption design
v-how influenced	not known
v-compensated for	not known
objectivity	high
o-phys. evidence	x-ray
usefulness	medium
u-legislators	yes
u-positive	yes
u-negative	
u-tabulated	yes, low incidence
sensitivity	medium
s-how much change	25 % decrease
generalizability	medium
g-valid generaliz.	not easily
feasibility	high
f-data collection	yes
f-special knowledge	medical
comments	

indicator	number of insurance claims for severe injury
indicator desc.	severe described in document #116, page 3: 1) > or = 5 days in hospital, or 2) 2 or more months off work, or 3) $5,000 or more in medical and wage payments or 4)multiple major broken bones, internal injuries, or serious head inj.
reviewer	Hoskin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	crash configuration, speed, seating position, etc.
v-how influenced	confounding factors affect severity
v-compensated for	can be controlled statistically
objectivity	medium
o-phys. evidence	no, information as reported on claims forms
usefulness	high
u-legislators	yes
u-positive	no
u-negative	yes, serious injury
u-tabulated	no
sensitivity	high
s-how much change	should be directly related
generalizability	medium
g-valid generaliz.	depends on characteristics of insured vehicles and drivers
feasibility	medium
f-data collection	depends on amount of detail in insurance records
f-special knowledge	no
comments	based on League General Insurance Co study (#116)

indicator	post-crash consciousness of accident victim
indicator desc.	
reviewer	Fearn
validity	medium
v-associated	yes
v-causally	not known
v-temporally	yes
v-other factors	yes
v-which others	traffic conditions, other law changes e.g. decrease in speed limit, crash configuration
v-how influenced	changes in these variables could influence the conscious state of accident victims
v-compensated for	unsure, most reports seem to assume that the belt use group and nonbelt use group are equally affected/unaffected by these variables and thus any change is due to use change
objectivity	high
o-phys. evidence	yes
usefulness	
u-legislators	information with regard to probability of serious injury though not as "quotable" as some indicators
u-positive	yes
u-negative	
u-tabulated	should be a part of ER reports; one study used NASS data, others were special studies
sensitivity	
s-how much change	not known
generalizability	medium
g-valid generaliz.	yes
feasibility	high
f-data collection	yes
f-special knowledge	medical
comments	

indicator	fractured mandible
indicator desc.	fractured mandible, x-ray diagnosis
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	no
v-other factors	yes
v-which others	interior design, steering wheels
v-how influenced	
v-compensated for	not known
objectivity	high
o-phys. evidence	yes, x-ray
usefulness	low
u-legislators	yes
u-positive	not known
u-negative	
u-tabulated	no
sensitivity	
s-how much change	not known
generalizability	
g-valid generaliz.	not known
feasibility	high
f-data collection	yes
f-special knowledge	medical
comments	no literature or experience to judge this indicator

indicator	noncontact soft tissue neck injuries
indicator desc.	neck sprains, whiplash
reviewer	Benjamin
validity	
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	head rests
v-how influenced	diminished
v-compensated for	periodic comparison of seat belt use vs. non-seat belt use, because head rests are becoming universal
objectivity	medium
o-phys. evidence	diagnosis can be fuzzy, depends on symptoms
usefulness	low
u-legislators	yes, disability and expense item
u-positive	no
u-negative	yes
u-tabulated	in trauma and insurance statistics (symptoms can be late)
sensitivity	high
s-how much change	appears to be significantly increased
generalizability	high
g-valid generaliz.	yes
feasibility	high
f-data collection	yes, by symptoms, persistent neck pain
f-special knowledge	medical
comments	limited usefulness due to negative effect of seat belt use. ratio indicator, sprain/all neck and head injuries, would be much better.

indicator	average hospital stay
indicator desc.	average number of days spent at hospital by MV crash victims
reviewer	Fearn
validity	medium
v-associated	yes
v-causally	no
v-temporally	yes
v-other factors	yes
v-which others	crash configuration, injury type/location, medical technology, course of treatment
v-how influenced	factors affecting injury severity will increase average hospital stay
v-compensated for	collect data from different regions, note trends in possible confounding factors
objectivity	high
o-phys. evidence	yes
usefulness	high
u-legislators	yes, directly related to injury severity or perhaps more importantly, costs.
u-positive	yes
u-negative	
u-tabulated	yes
sensitivity	low
s-how much change	mixed data, some indicate rather large reduction in indicator while in others the change was not significant
generalizability	medium
g-valid generaliz.	unsure due to variability in data noted above
feasibility	high
f-data collection	yes
f-special knowledge	no
comments	

indicator	occupant-to-occupant injuries
indicator desc.	"collision" between occupants within a vehicle
reviewer	Landes
validity	high
v-associated	yes, in multiple occupant situations
v-causally	yes
v-temporally	yes
v-other factors	no
v-which others	
v-how influenced	
v-compensated for	
objectivity	medium
o-phys. evidence	some guess work needed in certain cases to separate occupant-to-occupant injuries from other injuries (e.g. occupant-interior injuries)
usefulness	medium
u-legislators	not known
u-positive	yes
u-negative	no
u-tabulated	no
sensitivity	high
s-how much change	any change in belt use of all occupants should produce change in indicator
generalizability	medium
g-valid generaliz.	
feasibility	low
f-data collection	not feasible as a single indicator
f-special knowledge	yes, medical if injury diagnosis is used, engineering if interior vehicle damage used.
comments	

indicator	kidney injury
indicator desc.	medical diagnosis in record of kidney injury (fuzzy definition)
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	interior design, steering wheel, protuberances
v-how influenced	tend to diminish with modern design
v-compensated for	periodic comparison of seat belt use and non-seat belt use statistics
objectivity	medium
o-phys. evidence	not clear
usefulness	low
u-legislators	yes
u-positive	yes
u-negative	
u-tabulated	to an extent. probably underreported. low incidence
sensitivity	medium
s-how much change	significant decrease but low incidence
generalizability	medium
g-valid generaliz.	fuzzy definition, low incidence
feasibility	high
f-data collection	yes, but this may further aggravate underreporting
f-special knowledge	medical
comments	diagnosis of kidney injury can be made on symptoms, physical exam, urinalysis, x-ray, with varying degrees of precision

indicator	pelvic injuries
indicator desc.	pelvic bone fractures, separations of pelvic girdle, x-ray diagnosis
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	seat design, clothing
v-how influenced	not known
v-compensated for	not known
objectivity	high
o-phys. evidence	x-ray
usefulness	medium
u-legislators	yes
u-positive	yes, but equivocable
u-negative	
u-tabulated	yes
sensitivity	low
s-how much change	not known, low incidence
generalizability	low
g-valid generaliz.	no
feasibility	high
f-data collection	yes
f-special knowledge	medical
comments	

indicator	safety belt replacement claims/paid cases
indicator desc.	incidence of insurance claims or retail/wholesale sales data for replacement safety belts
reviewer	Hoskin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	probably not
v-which others	normal wear ?, accident damage other than crashes ?
v-how influenced	
v-compensated for	
objectivity	high
o-phys. evidence	yes
usefulness	low
u-legislators	no
u-positive	no
u-negative	yes
u-tabulated	no
sensitivity	medium
s-how much change	depends on current incidence of safety belt replacement, which is unknown
generalizability	medium
g-valid generaliz.	
feasibility	medium
f-data collection	yes
f-special knowledge	may require special training to distinguish causes of safety belt damage
comments	no literature support.

indicator	external injuries
indicator desc.	soft tissue injuries, skin lacerations
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	no, no good baseline data
v-other factors	yes
v-which others	seating position, auto design
v-how influenced	not known
v-compensated for	
objectivity	high
o-phys. evidence	yes
usefulness	medium
u-legislators	yes
u-positive	yes
u-negative	
u-tabulated	no
sensitivity	medium
s-how much change	not known, but expect will include any slight injuries
generalizability	low
g-valid generaliz.	perhaps
feasibility	low
f-data collection	yes
f-special knowledge	medical records clerk
comments	only one article. articles indicate that laceration rate reduced on face and extremities by seat belt use, but data on lacerations is usually absorbed by regional classification so it is difficult to retrieve statistics on just lacerations. Facial lacerations account for many facial injuries and appear under that indicator.

indicator	aorta rupture
indicator desc.	aortic rupture with survival
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	clothing, position in auto, speed
v-how influenced	not well defined
v-compensated for	no
objectivity	high
o-phys. evidence	yes
usefulness	low
u-legislators	yes
u-positive	not known
u-negative	not known
u-tabulated	no
sensitivity	low
s-how much change	no change in literature
generalizability	low
g-valid generaliz.	no
feasibility	high
f-data collection	yes
f-special knowledge	medical
comments	poor indicator. no significant change with seat belt use laws. most cases are fatal.

indicator	leg and ankle fractures
indicator desc.	x-ray diagnosis
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	not known
v-temporally	yes
v-other factors	yes
v-which others	interior design, increased impact resistance
v-how influenced	not known
v-compensated for	
objectivity	high
o-phys. evidence	yes
usefulness	low
u-legislators	yes
u-positive	
u-negative	equivocable
u-tabulated	yes, low incidence
sensitivity	low
s-how much change	
generalizability	low
g-valid generaliz.	no
feasibility	high
f-data collection	yes
f-special knowledge	medical
comments	poor indicator.

indicator	windshield replacement/damage claims
indicator desc.	incidence of insurance claims or retail/wholesale sales data for replacement windshields
reviewer	Hoskin
validity	medium
v-associated	yes
v-causally	yes, but not necessarily directly
v-temporally	yes
v-other factors	yes
v-which others	other causes of windshield damage such as stones or vandalism
v-how influenced	same resulting damage
v-compensated for	may not be able to compensate
objectivity	high
o-phys. evidence	yes
usefulness	low
u-legislators	no
u-positive	no
u-negative	yes
u-tabulated	no
sensitivity	medium
s-how much change	depends on how may crashes result in windshield damage
generalizability	medium
g-valid generaliz.	
feasibility	medium
f-data collection	yes
f-special knowledge	may require special training to distinguish causes of damage to windshields
comments	no literature support.

indicator	facial bone/cranium separations
indicator desc.	LeFort facial fracture classification
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	no
v-other factors	yes
v-which others	interior design, steering wheels
v-how influenced	might be influenced in future with airbags
v-compensated for	not known
objectivity	high
o-phys. evidence	yes
usefulness	low
u-legislators	yes, disfigurement disability
u-positive	yes
u-negative	
u-tabulated	no, requires detailed case study
sensitivity	
s-how much change	not known
generalizability	
g-valid generaliz.	not known
feasibility	low
f-data collection	yes, but by labor intensive effort by experts
f-special knowledge	yes, maxilofacial surgeons, x-ray technicians
comments	not practical indicator

indicator	type/nature of dental repairs
indicator desc.	not defined
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	no
v-other factors	yes
v-which others	interior car design, steering wheel, protuberances
v-how influenced	unknown
v-compensated for	unknown
objectivity	high
o-phys. evidence	yes
usefulness	low
u-legislators	yes
u-positive	not known
u-negative	
u-tabulated	no
sensitivity	
s-how much change	not known
generalizability	
g-valid generaliz.	not known
feasibility	low
f-data collection	no, perhaps insurance records
f-special knowledge	yes, dental
comments	dental records unlikely to be generated in emergency room or hospital except as part of multiple facial injuries. no data base medically, maybe insurance records. needs evaluation.

indicator	liver injury
indicator desc.	diagnosis of liver injury in medical record
reviewer	Benjamin
validity	medium
v-associated	yes
v-causally	not known
v-temporally	no
v-other factors	not known
v-which others	
v-how influenced	
v-compensated for	
objectivity	
o-phys. evidence	could be
usefulness	
u-legislators	yes
u-positive	not known
u-negative	not known
u-tabulated	no
sensitivity	
s-how much change	not known
generalizability	
g-valid generaliz.	no
feasibility	medium
f-data collection	requires intensive medical study
f-special knowledge	medical
comments	low incidence, no useful data base, not an indicator.

indicator	facial lacerations (major soft tissue injuries)
indicator desc.	appears as facial injuries in most studies. many are minor according to AIS
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	no
v-other factors	yes
v-which others	auto design, windshields
v-how influenced	
v-compensated for	no
objectivity	high
o-phys. evidence	yes
usefulness	low
u-legislators	yes
u-positive	not known
u-negative	
u-tabulated	no
sensitivity	
s-how much change	not known
generalizability	low
g-valid generaliz.	no
feasibility	low
f-data collection	no
f-special knowledge	
comments	in practice, lacerations get absorbed into other categories--facial soft tissue or facial injuries overall. literature supports only the general category facial injuries.

indicator	splenic injury
indicator desc.	medical diagnosis
reviewer	Benjamin
validity	medium
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	interior design, steering wheel, protuberances, clothing
v-how influenced	not known
v-compensated for	not known
objectivity	high
o-phys. evidence	requires surgical exploration
usefulness	low
u-legislators	yes
u-positive	equivocable
u-negative	equivocable
u-tabulated	no
sensitivity	low
s-how much change	not known
generalizability	low
g-valid generaliz.	no
feasibility	medium
f-data collection	yes, but would provide very low incidence
f-special knowledge	medical
comments	low incidence, variable correlation. poor indicator.

indicator	blood transfusions
indicator desc.	
reviewer	Race
validity	low
v-associated	there is no literature link to blood transfusions
v-causally	with belt use or motor-vehicle trauma
v-temporally	
v-other factors	yes
v-which others	surgical change in patients using their own blood
v-how influenced	during nonemergency surgery--biggest confounding factor
v-compensated for	the effect of AIDS on blood consumption
objectivity	high
o-phys. evidence	linking it to motor-vehicle related use may be difficult
usefulness	medium
u-legislators	
u-positive	yes, assuming belt use reduced need
u-negative	
u-tabulated	
sensitivity	low
s-how much change	not known
generalizability	low
g-valid generaliz.	
feasibility	low
f-data collection	
f-special knowledge	
comments	

indicator	chest wall
indicator desc.	not well defined. other specific sternum and rib indicators are more explicit
reviewer	Benjamin
validity	high
v-associated	yes
v-causally	yes
v-temporally	not well defined
v-other factors	yes
v-which others	position, clothing
v-how influenced	varies
v-compensated for	difficult
objectivity	medium
o-phys. evidence	may be diagnosed on symptoms alone
usefulness	low
u-legislators	yes
u-positive	
u-negative	*incidence increased with seat belt use*
u-tabulated	no
sensitivity	low
s-how much change	not known
generalizability	low
g-valid generaliz.	no
feasibility	low
f-data collection	no
f-special knowledge	medical
comments	subsets relating to ribs and sternum are better indicators, but have negative effects

indicator	rib fractures
indicator desc.	rib fractures, x-ray diagnosis. rib bruise--hazy term, not definable
reviewer	Benjamin
validity	medium
v-associated	yes
v-causally	yes
v-temporally	yes
v-other factors	yes
v-which others	interior design, protuberances, steering wheel, position, clothing
v-how influenced	design trends are to minimize
v-compensated for	compare seat belt use and non-use statistics periodically
objectivity	medium
o-phys. evidence	need x-ray, but clinical diagnoses are reported
usefulness	low
u-legislators	yes
u-positive	equivocable
u-negative	
u-tabulated	yes
sensitivity	low
s-how much change	not known, may not be correlated
generalizability	low
g-valid generaliz.	no
feasibility	medium
f-data collection	yes, requires routine x-ray
f-special knowledge	medical
comments	accuracy of rib fracture reporting is low. many cases not diagnosed. seat belts both protect and cause. not good indicator.

indicator	frequency of insurance injury claims
indicator desc.	claim frequency per 1,000 insured vehicle years
reviewer	Hoskin
validity	medium
v-associated	yes
v-causally	not directly
v-temporally	yes
v-other factors	yes
v-which others	age of vehicle and driver, deductible amount, etc.
v-how influenced	affects injury severity and claims incidence
v-compensated for	can be statistically controlled by standardization
objectivity	medium
o-phys. evidence	no, based on claims filed by insured
usefulness	low
u-legislators	insurance costs not a high priority issue
u-positive	yes, reduction of costs to consumers if premiums are reduced
u-negative	no
u-tabulated	no, only through special studies, e.g. #67 and #68
sensitivity	low
s-how much change	
generalizability	low
g-valid generaliz.	
feasibility	medium
f-data collection	perhaps a narrower definition would produce a better indicator
f-special knowledge	no
comments	

indicator	*general bruising (thorax)*
indicator desc.	not well defined
reviewer	Benjamin
validity	medium
v-associated	yes
v-causally	in restricted circumstances
v-temporally	no
v-other factors	yes
v-which others	interior design, clothing, position
v-how influenced	complex
v-compensated for	no
objectivity	medium
o-phys. evidence	partially, also symptoms
usefulness	low
u-legislators	no
u-positive	not known
u-negative	not known
u-tabulated	no
sensitivity	low
s-how much change	no
generalizability	low
g-valid generaliz.	no
feasibility	low
f-data collection	no
f-special knowledge	*medical*
comments	poor indicator.

indicator	facial scars
indicator desc.	not well defined
reviewer	Benjamin
validity	low
v-associated	yes
v-causally	yes
v-temporally	no
v-other factors	yes
v-which others	auto design
v-how influenced	
v-compensated for	no
objectivity	medium
o-phys. evidence	depends on definitions--size, color, etc.
usefulness	low
u-legislators	probably
u-positive	direction of effect not known
u-negative	
u-tabulated	no
sensitivity	
s-how much change	not known
generalizability	low
g-valid generaliz.	no
feasibility	low
f-data collection	no
f-special knowledge	
comments	do not know of any data base on scars or literature relating scars to vehicular accidents.

indicator	nature of disease (N) codes
indicator desc.	probably most useful if linked with other factors
reviewer	Race
validity	
v-associated	
v-causally	
v-temporally	
v-other factors	
v-which others	
v-how influenced	
v-compensated for	
objectivity	
o-phys. evidence	
usefulness	
u-legislators	
u-positive	
u-negative	
u-tabulated	
sensitivity	
s-how much change	
generalizability	
g-valid generaliz.	
feasibility	
f-data collection	
f-special knowledge	
comments	this needs to be viewed as a prerequisite to identify cases. very crude as an indicator per se.

INDICATOR INDEX

Note: Wording of indicator may differ slightly from wording used in Volume I, Appendix D, Expert Team Ratings of Candidate Indicators, or Volume II, Appendix B, Expert Team Comments on Indicators. Wording here is the same as wording in Volume I, Appendix E, Ranked Listing of Candidate Indicators.