Traffic Calming Programs & Emergency Response

A Competition of Two Public Goods!

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Austin's Background

- 1994 - Started Speed Hump Installations
- 600 Streets Requested Humps/1400+ Now
- AFD/EMS alarmed at proliferation of # of humps
- Won denials, but PW&T pointed finger at AFD
- 1996 City Manager orders a study on response times
- 1997 Program suspended/Citizen Focus Group formed
- Fire/EMS could no longer “veto” any installation

Masters Professional Report

- PR Required for MPA Degree at UT
- Focus on a real public policy issue/TC
- Incorporate quantitative/qualitative analysis
- Literature from Calongne/Bowman
- Objective-to analyze the impacts of TC devices upon emergency responses in Austin
- Not an official COA Study

Public Good #1-Safe Neighborhoods

- Low crime rates
- Citizens want safe neighborhoods
- Reduced traffic speeds
- Reduced traffic volumes
- Reduced accidents
- Traffic calming devices are installed to achieve this

Public Good #2-Good Response Times

- Citizens want efficient & prompt emergency services
- Large resources are expended to provide this service
- Quick response times are directly correlated to the effectiveness of the service
- Most performance measures are impacted by response times

The Dilemma?

- TC devices are installed to slow down traffic for safer neighborhoods
- TC devices delay response times
- Thus, “a competition of two public goods”

Citizens Want Their Cake and Eat It Too!

- Want good response times
- Want low crime rates
- Good transportation systems - *But don't put'em on my street!*
- Quiet Neighborhoods with no speeding or traffic volume
- Not willing to trade one for the other

Presentation Purpose

- Share research information
- Provide a resource/methodology for your analysis!
- "Don't Reinvent the Wheel"
- Allow you to develop public policy using quantitative analysis

Emergency Services Issues

- Compared Tests/TC impacts Fire/EMS units
  - Portland, OR (January 1996)
  - Austin, TX (March 1996)
  - Montgomery County, MD (August 1997)
  - Berkeley, CA (October 1997)
  - Boulder, CO (April 1998)
- 2 to 10 second delay per device/depending on vehicle type
- No real impacts to PD units due to size

Emergency Services Issues

- Numerous FF/Paramedic IOJ’s due to TC
  - Montgomery Co, MD
    - injury to neck & back while wearing seat belt & PPE
    - limited duty for 1 year; then disability retirement
  - Sacramento, CA
    - 4 separate injuries/all were spine/neck/vertebrae
    - Striking heads on roof/Seat belts were used
    - One IOJ was actually during speed hump testing

Emergency Services Issues

- Numerous FF/Paramedic IOJ's due to TC
  - Fresno, CA
    - 4 injuries/striking heads on apparatus roofs
    - Occurs mainly to Officer riding positions
    - Dept. investigation revealed "drivers" were less likely to be injured due to "air-ride" seats; Officers had "bench style" seat
    - Rear facing FF positions were less vulnerable for those riding in "raised roof cab" apparatus

Emergency Services Issues

- Fleet Damage
  - Erratic weight shifts increases flexing and stress to suspension components
  - Fresno, CA
    - Experienced frame cracks
  - Berkeley, CA
    - Gusset plates were welded to the frame to stop stress fractures
    - Direct result from speed humps on a major route

Emergency Services Issues

- Sacramento, CA
  - Several Engines with flattened springs or body welds breaking
  - Each apparatus with this condition was assigned to a district with more speed humps than others
  - Actually had a front axle sheer off during a response after traversing a speed hump!
  - During a speed hump test, several compartment doors abruptly came open on both sides; equipment strewn upon the street

Emergency Services Issues

- Austin, TX
  - A power steering dip stick was dislodged from a unit during TC hump testing procedures
- San Diego, CA
  - Booster/Water tank cracked due to humps
- Louisville, CO
  - Booster/water tank broken while going over a hump
- Sacramento CA Regional Transit System
  - No longer provide bus service on routes with speed humps

Environmental Air Quality Issues

- TC devices increase air emissions
- Confirmed by several European studies
- Emissions increase with more acceleration/deceleration over each hump
- More emissions are emitted at slower travel speeds than at higher speeds (>30 mph)
- Portland, ME embarrassed/DOT funding revoked
- Austin, like others, already near EPA “non-attainment” status

Civil Liability Issues

- Major Potential Civil Liability is with ADA
  - “Roadways” are included in the definition of facilities; alterations must comply with ADA
- In 2000 there was no national standards recognizing TC devices as “approved traffic control devices”/MUTCD

Civil Liability Issues

- 85th percentile speed studies are a problem
  - PW&T don't want to do them; will cause the speed limit to be raised rather than lowered

Austin Pedestrian Safety

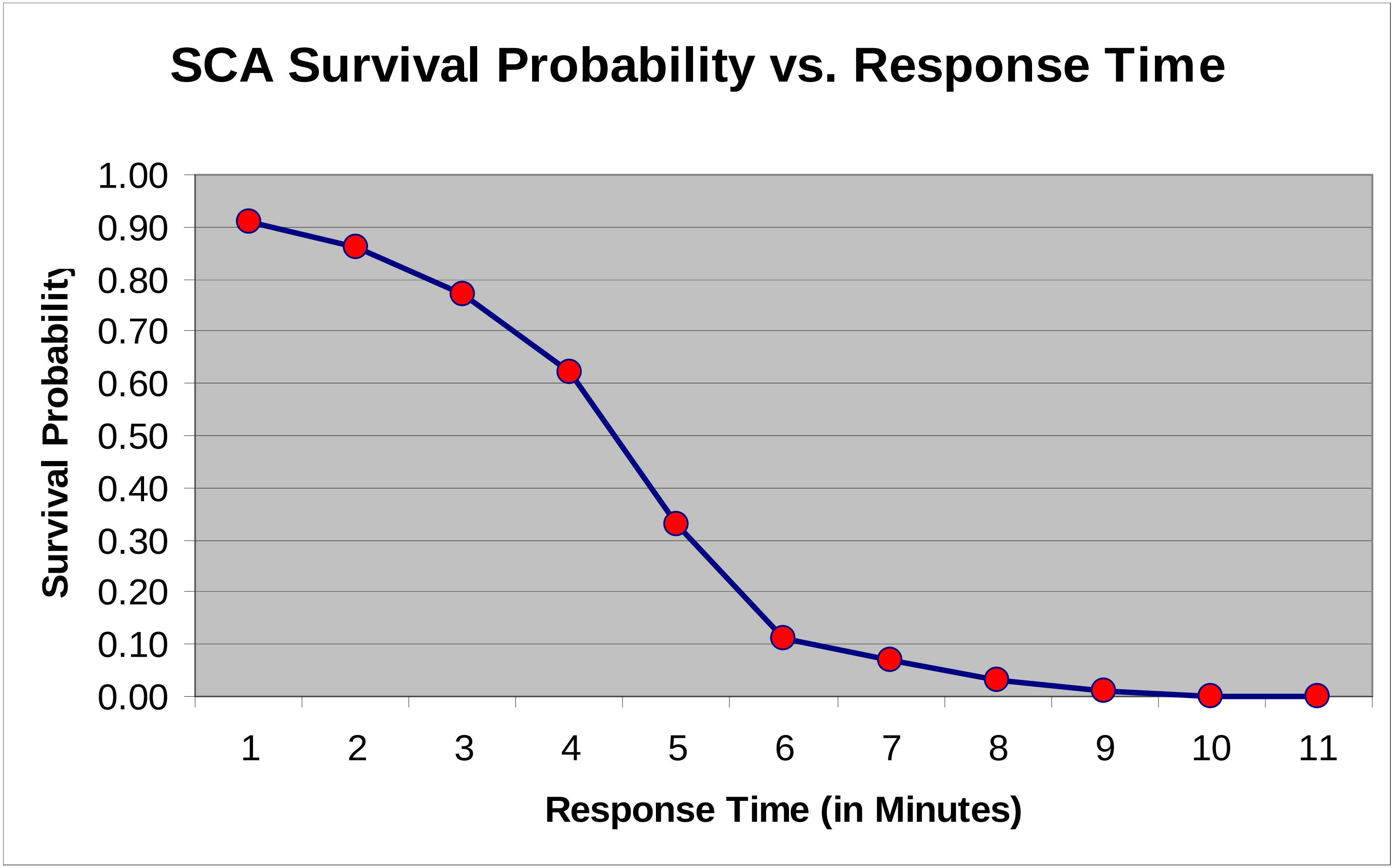
- Good data for 3 year period (1997-1999)
- Avg. 15.3 fatalities per year
- Major surprise finding here:
  - No more than 1 fatality per year on neighborhood streets
  - 1 each in 1997 & 1998; zero in 1999
- Virtually all pedestrian fatalities were on major thoroughfares/expressways
- These are ineligible for TC devices

Austin Pedestrian Safety

- Another shocking finding:
  - Of the 46 fatalities for that 3 year period:
  - only 5 involved *“failure to control speed”*
  - none of these 5 occurred on neighborhood streets
  - Primary factor for all others was *“pedestrian failure to yield right of way”*
  - This factor was also cited for the 2 neighborhood street fatalities in 97 & 98

Impact to Fire/EMS Services

- Good response time data for Fire/EMS
- Good survival rate data on SCA
  - Utstein Report tracks specific data on each SCA
  - AHA survival rate curve established
  - Could incorporate the Bowman Model
  - Could compare pedestrian/SCA fatality rates


SCA Survival Probability vs. Response Time
Survival Probability
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1
2
3
4
5
6
7
8
9
10
11
Response Time (in Minutes)

Bowman Risk Probability Model

- Focuses on SCA data
- Calculates the positive gains of lives saved when response times are reduced
- Conversely, the negative loss of lives when response times are increased
- Calculations can generated for:
  - General increases, i.e. 30 second increase
  - Increases per # of TC devices
  - General decreases, i.e. 20 second decrease

Your Benefit Today?

- Your FD can use this Model, if you have 4 elements:
  - Current FD response time frequency distribution
  - AHA Defibrillation/SCA Survival Probabilities
  - Your input variable for delay/improvement
  - # of SCA incidents in your area
- More studies need to be done by FDs!

Table E.1 Summary of All SCA Models

Risk Analysis Model for Victims of Sudden Cardiac Arrest
From Response Delays Due to Traffic Calming Devices

Name of Emergency Service Agency	***Date of Analysis***	***Analysis Period***
Austin Fire Department	*03/01/00*	*12-7-97 to 11-30-98*

Current FD Incident Information		**Cardiac Arrest Probable Survival Fraction**	**Installation of Traffic Calming Devices and Changes in Arrival Time**						**Estimated Risk Utilizing Arrival Probability X Survival Probability**				
Midpoint of Arrival Interval	**1998 Arrival Fraction**		*By Percentage*		*By Devices On Route*				*1998 Arrivals*	*% Changes*		*Device Delays*	
			14%	-14%	0.085	A	0.085	B		14%	-14%	A	B
						#		#				0.085	0.085
0.50	0.018	0.91	0.070	-0.070	0.26	3	0.43	5	0.016	0.016	0.016	0.016	0.016
1.50	0.067	0.86	0.210	-0.210	0.26		0.43		0.058	0.057	0.059	0.056	0.055
2.50	0.205	0.77	0.350	-0.350	0.26		0.43		0.157	0.149	0.165	0.151	0.147
3.50	0.269	0.62	0.490	-0.490	0.26		0.43		0.167	0.134	0.190	0.151	0.139
4.50	0.209	0.33	0.630	-0.630	0.26		0.43		0.070	0.035	0.111	0.053	0.044
5.50	0.107	0.11	0.770	-0.770	0.26		0.43		0.012	0.008	0.028	0.010	0.009
6.50	0.054	0.07	0.910	-0.910	0.26		0.43		0.004	0.002	0.006	0.003	0.003
7.50	0.027	0.03	1.050	-1.050	0.26		0.43		0.001	0.000	0.002	0.001	0.001
8.50	0.015	0.01	1.190	-1.190	0.26		0.43		0.000	0.000	0.001	0.000	0.000
9.50	0.009	0.00	1.330	-1.330	0.26		0.43		0.000	0.000	0.000	0.000	0.000
10.50	0.020	0.00	1.470	-1.470	0.26		0.43		0.000	0.000	0.000	0.000	0.000
					Total:	3	Total:	5					
	1.000		Average Survival Probability for All Cases:						0.486	0.401	0.577	0.443	0.414

Yearly Number of SCA Cases:	442

Predicted Lives Saved:	**215**	**177**	**255**	**196**	**183**
Change from Present:	0	-37	41	-19	-31

NOTES: Arrival Times and Delays are in minutes

The "Probable Survival Fraction" is computed from a curve-fit formula from the American Heart Association

All Yellow Cells to be filled with local FD histogram data for response times

Risk Analysis Model for Victims of Sudden Cardiac Arrest
For Response Delays Due to Traffic Calming Devices

Agency:	*Austin Fire Department*
Date of Analysis:	*03/01/00*
Analysis Period:	*12-1-97 to 11-30-98*
Analysis Type:	*General Increase in Response Time*

Response Times				
Current Response Time:	3.62	*Minutes*		
Risk % Delay:	14%	*is equal to a*	0.51	*Minute Delay*
Delayed Response Time:	4.13	*Minutes*		

Current FD Incident Information		***Cardiac Arrest Probable Survival Fraction***	*General Delay Response Fraction*	*Current Local Survival Rates*	*Traffic Calming Adjusted Survival Rates*
Midpoint of Arrival Interval	***1998 Arrival Fraction***		14%		14%
0.50	0.018	0.91	0.070	0.016	0.016
1.50	0.067	0.86	0.210	0.058	0.057
2.50	0.205	0.77	0.350	0.157	0.149
3.50	0.269	0.62	0.490	0.167	0.134
4.50	0.209	0.33	0.630	0.070	0.035
5.50	0.107	0.11	0.770	0.012	0.008
6.50	0.054	0.07	0.910	0.004	0.002
7.50	0.027	0.03	1.050	0.001	0.000
8.50	0.015	0.01	1.190	0.000	0.000
9.50	0.009	0.00	1.330	0.000	0.000
10.50	0.020	0.00	1.470	0.000	0.000
		Overall Survival Rates:		0.486	0.401

Annual SCA		**Predicted Lives Saved:**	215	177
Cases:	442	Change from Present:	0	-37

Risk Analysis Model for Victims of Sudden Cardiac Arrest
For Response Delays Due to Traffic Calming Devices

Agency:	*Austin Fire Department*
Date of Analysis:	*03/01/00*
Analysis Period:	*12-1-97 to 11-30-98*
Analysis Type:	*Response Delay per Number of Devices*

Response Times				
Current Response Time:	3.62	*Minutes*		
Risk % Delay:	0.085	*Minute Delay per Device X*	3	*Devices =*
Total Delay	0.26	*Minute Delay*		
Delayed Response Time:	3.88			

Current FD Incident Information		**Cardiac Arrest Probable Survival Fraction**	*Device Delay Response Fraction*	*Number of Devices On Route*	*Current Local Survival Rates*	*Traffic Calming Adjusted Survival Rates*
Midpoint of Arrival Interval	**1998 Arrival Fraction**		0.085			8.5%
0.50	0.018	0.91	0.26	3	0.016	0.016
1.50	0.067	0.86	0.26		0.058	0.056
2.50	0.205	0.77	0.26		0.157	0.151
3.50	0.269	0.62	0.26		0.167	0.151
4.50	0.209	0.33	0.26		0.070	0.053
5.50	0.107	0.11	0.26		0.012	0.010
6.50	0.054	0.07	0.26		0.004	0.003
7.50	0.027	0.03	0.26		0.001	0.001
8.50	0.015	0.01	0.26		0.000	0.000
9.50	0.009	0.00	0.26		0.000	0.000
10.50	0.020	0.00	0.26		0.000	0.000
		Overall Survival Rates:			0.486	0.443

Annual SCA Cases:	442	**Predicted Lives Saved:**	215	196
		Change from Present:	0	-19

Risk Analysis Model for Victims of Sudden Cardiac Arrest
For Response Delays Due to Traffic Calming Devices

Agency:	*Austin Fire Department*
Date of Analysis:	*03/01/00*
Analysis Period:	*12-1-97 to 11-30-98*
Analysis Type:	*General Response Time Improvement*

Response Times				
Current Response Time:	3.62	*Minutes*		
Risk (-%) Improvement:	-14%	*is equal to a*	-0.51	*Minute Delay*
Delayed Response Time:	3.11	*Minutes*		

Current FD Incident Information		***Cardiac Arrest Probable Survival Fraction***	*Desired Improvement To Response Time*	*Current Local Survival Rates*	*New Improved Survival Rates*
Midpoint of Arrival Interval	***1998 Arrival Fraction***		-14%		-14%
0.50	0.018	0.91	-0.070	0.016	0.016
1.50	0.067	0.86	-0.210	0.058	0.059
2.50	0.205	0.77	-0.350	0.157	0.165
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9.50	0.009	0.00	-1.330	0.000	0.000
10.50	0.020	0.00	-1.470	0.000	0.000
		Overall Survival Rates:		0.486	0.577

Annual SCA		**Predicted Lives Saved:**	215	255
Cases:	442	Change from Present:	0	41

What did the Model Tell Us?

- With a 30 second increase in response
  - 37 additional lives would be lost to SCA
- With a 15 second increase in response
  - 19 additional lives would be lost to SCA
- With a 30 second **reduction** in response
  - Would yield +41 more lives saved per year

Table.1

Risk Benefit Ratio for Austin, TX

Policy/Program	Projected Risk	Projected Benefit	Risk/Benefit Ratio
Installation of Traffic Calming Devices	37 lives lost to SCA	1 pedestrian life saved	37 lives lost for 1 life saved
Installation of Opticoms to Reduce Response Time	1 pedestrian life lost	41 lives saved from SCA	1 life lost for 41 lives saved

18 Recommendations for Policy Makers

- Avoid Conflict Prior to Program Adoption
  - Have each dept. conduct a policy analysis
  - Be sure it includes an impact statement
  - Mesa, AZ FD has a good one
- Verify that a legitimate problem exists, not a perceived one!
- Evaluate impacts to
  - Emergency responses
  - Air Quality
  - Legal Risks (not authorizations)

18 Recommendations for Policy Makers

- Eliminate root causes of traffic problems; don’t treat symptoms with TC
- Allow emergency services the authority to reject installations
- Balance your TC program with additions to your electronic control system
- Prohibit installation of TCD’s on streets of fire stations/primary response routes

18 Recommendations for Policy Makers

- Encourage the use of public hearings prior to TC plan installations
- Base public policy decisions more so upon fact and not just emotions!

THANK YOU

As The Pleasure Was Truly Mine!

Questions?

How Do I Obtain This Report?

Email/Phone/Snail Mail

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Traffic Speed/ Volume /Accidents

- Valid analysis is difficult
- Too many variables
- Inconsistent data collection: time, day, seasons, road conditions, diversions, etc.
- Speed
  - Data from TC Neighborhoods did show a 3 to 5 mph reduction
  - Conflicting as speeds also increased on some streets

Traffic Speed/ Volume /Accidents

- Volume
  - Rarely done; very labor intensive for wide area survey
  - TC Neighborhoods saw a decrease in some areas & increase in others
  - Traffic volume did not decrease; it simply moved to someplace else!

PR on Traffic Calming

- Extensive/All Aspects of TC
- 275 pages in length
  - With supervised quantitative analysis on the Austin issue
- Also includes the following Chapters:
  - Overview of the TC debate
  - History of TC and Types of TC devices
  - Emergency Service Issues
  - Environmental Air Quality Issues

PR on Traffic Calming

- Civil Liability Issues
- TC Postures of Other Local Governments
- TC Impact Analysis for City of Austin
- Discussion on Policy Implications
- 18 Recommendations for Policy Makers

The Public Good

- All of us in government work towards improving the public good for our citizens
- We want to make society better
- We develop innovative programs and processes to contribute to the quality of life

Research Initiatives/References

- Speed Hump/Circle Tests
  - Portland, OR (January 1996)
  - Austin, TX (March 1996)
  - Montgomery County, MD (August 1997)
  - Berkeley, CA (October 1997)
  - Boulder, CO (April 1998)
- Kathleen Calongne, Boulder CO
  - *Problems Associated with Traffic Calming Devices*
- Ray Bowman, Boulder CO
  - *SCA Risk Probability Statistical Model*

Impact Analysis for Austin TC Devices

- This Section is the heart of the PR
- Good data on the time delays; but no existing analysis on the effect of the delays
- Risk/Benefit Analysis of Traffic Calming
- Looked specifically at Austin data
- Attempted to analyze several elements:
  - Analysis of reduced speed & volume data
  - Pedestrian fatality rates/causes

Impact Analysis for TC Devices

- Impact of TC devices on emergency service delivery for Fire/EMS only
- Did not evaluate impact on PD units

Risk/Benefit Ratio

- Methodology used a lot by analysts
- Used where the risk of one policy is divided by the benefits of another
- Used it for Austin's situation since
  - Pedestrian fatality info was established
  - SCA rate was established
  - Impact of TC on SCA survival established