

# Trauma 1970 – 2010 in Austria

## Implications for Trauma Care

### Possible Lessons for Slovakia

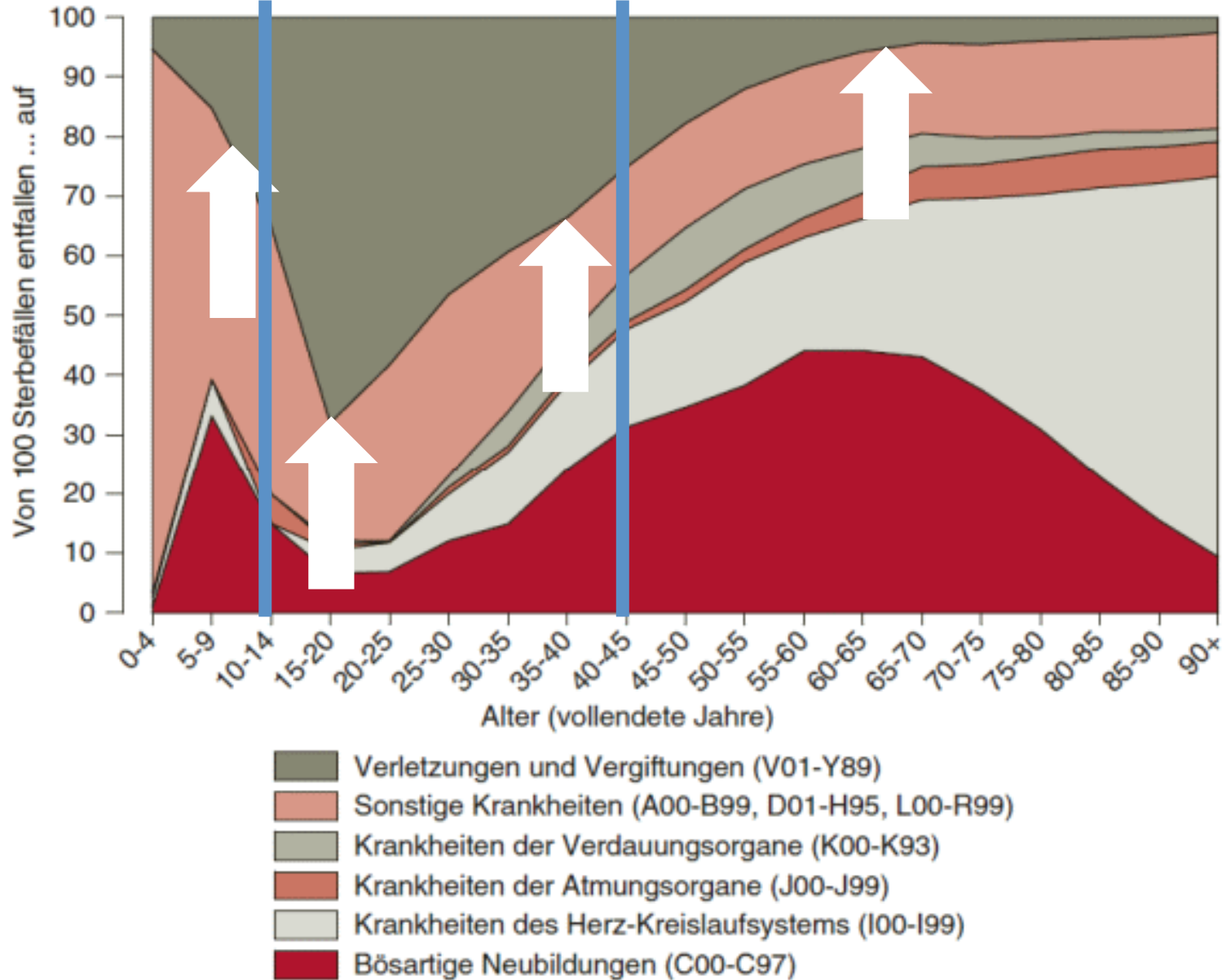
# Outline

- Relevance of „trauma“
- Trauma prevention & other factors
- Impact of prevention & other factors on trauma deaths
- Impact of prevention & other factors on epidemiology of hospital admission for trauma
- Consequences for Trauma Care

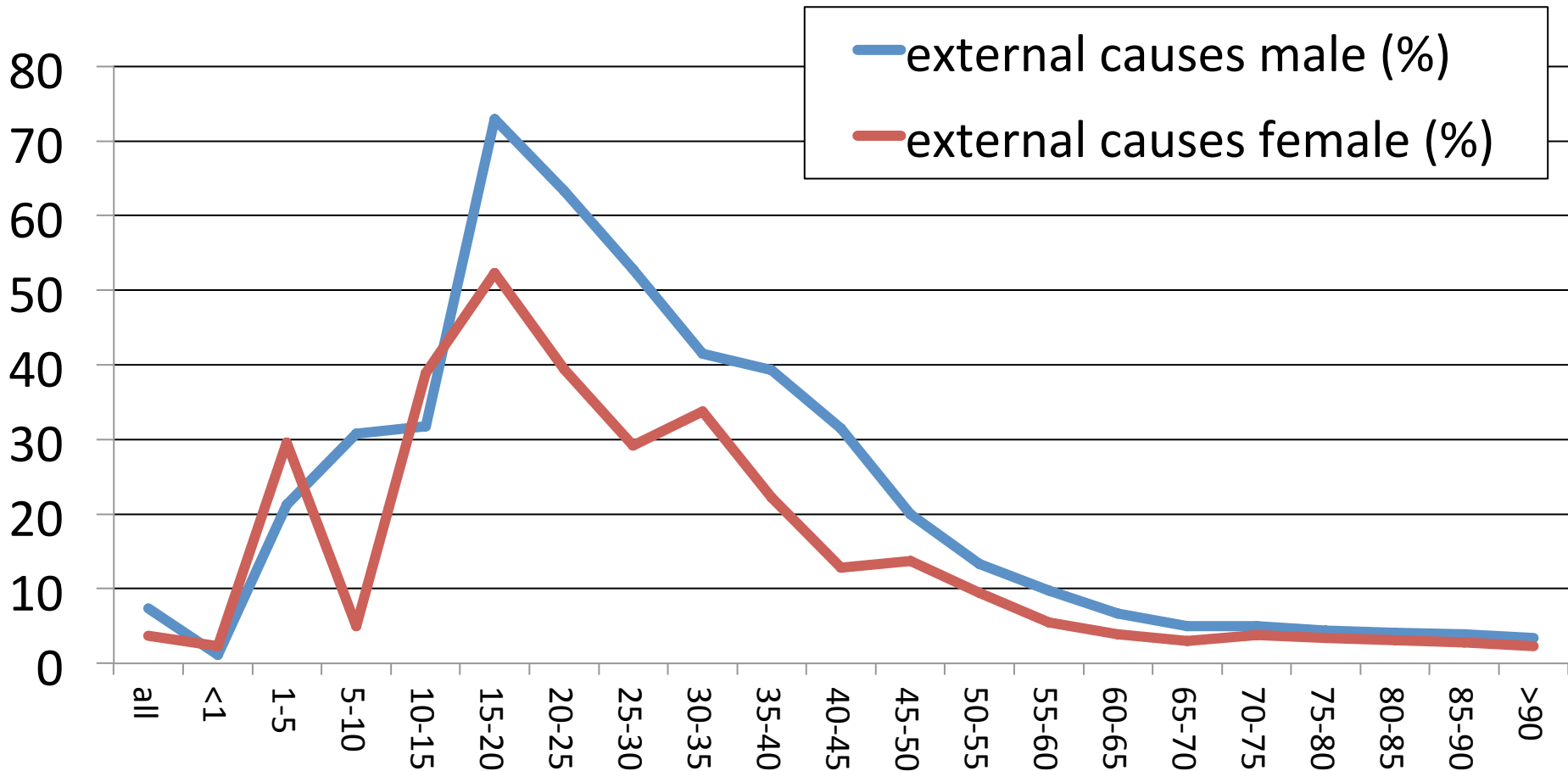
# Relevance of Trauma

- In 2010, **5,5%** of Austrian deaths due to trauma
- Trauma is the leading cause of death in young people (ages 10 – 45 years)
- The „Productive Life Loss“ is greater than that caused by „cardiovascular diseases“ or „cancer“
- In economic terms, trauma is the most important disease!!

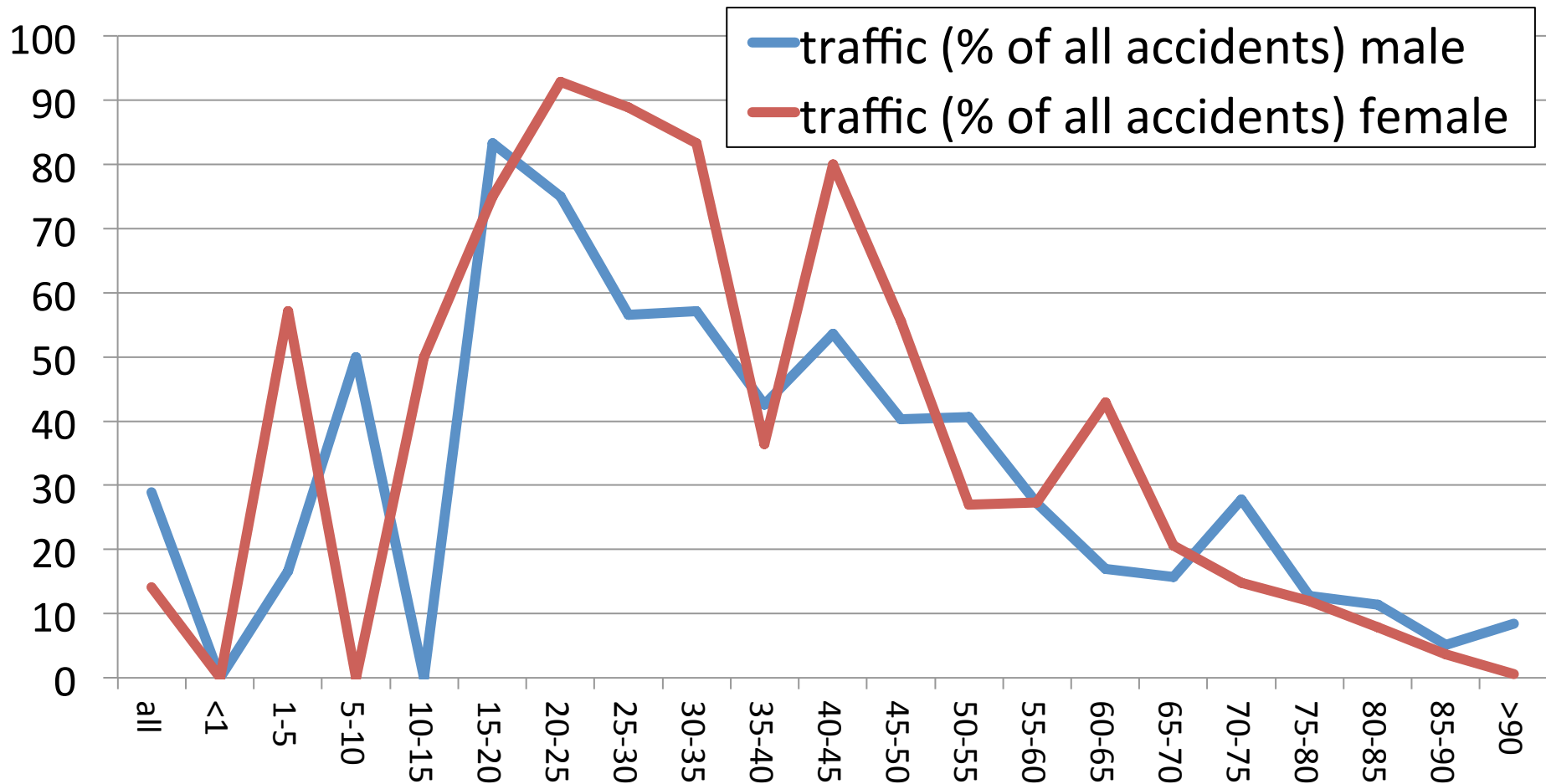
# Prozentverteilung der Gestorbenen 2010 nach Todesursachen je Altersgruppe



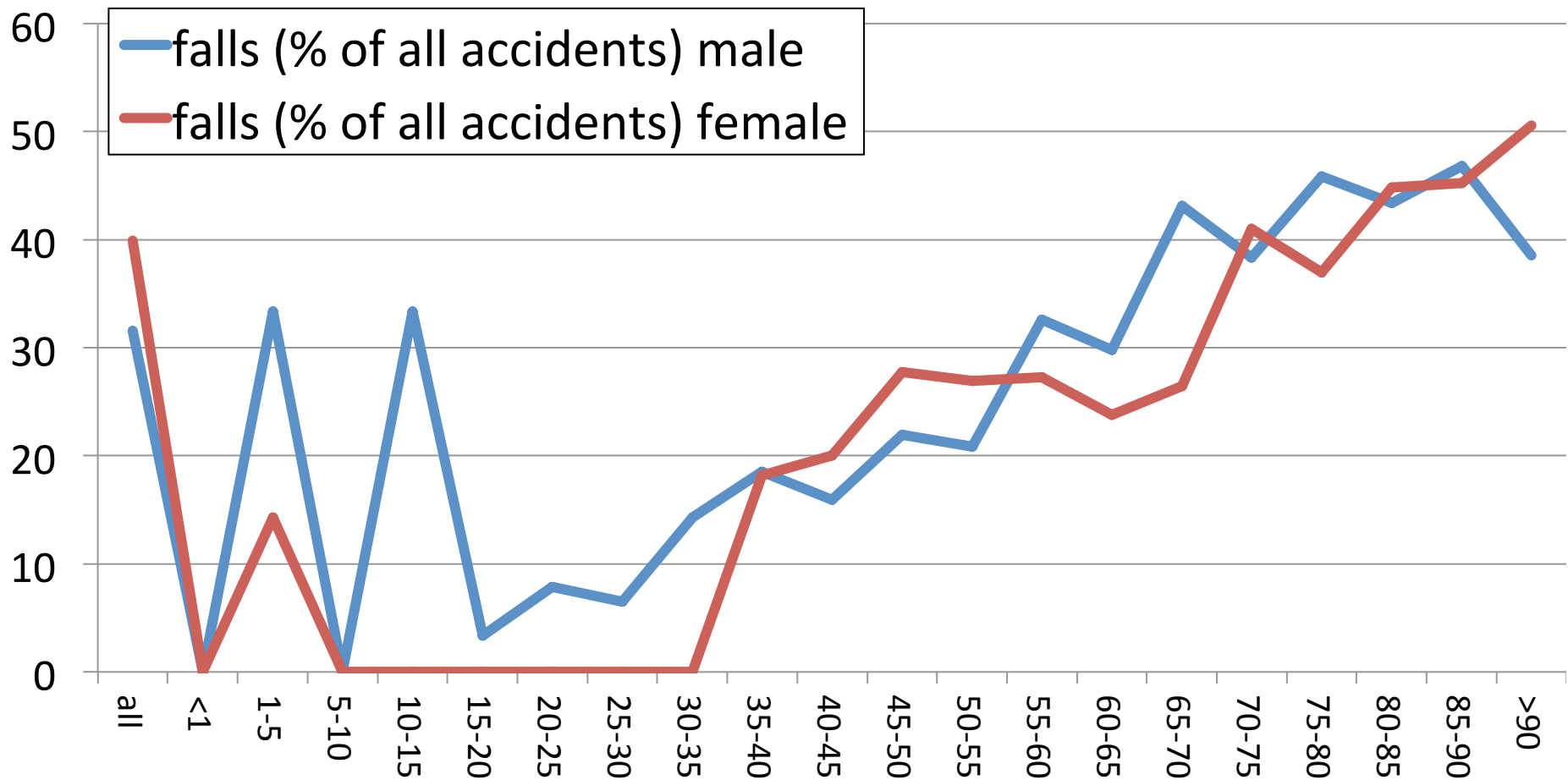
# % of Deaths due to external causes



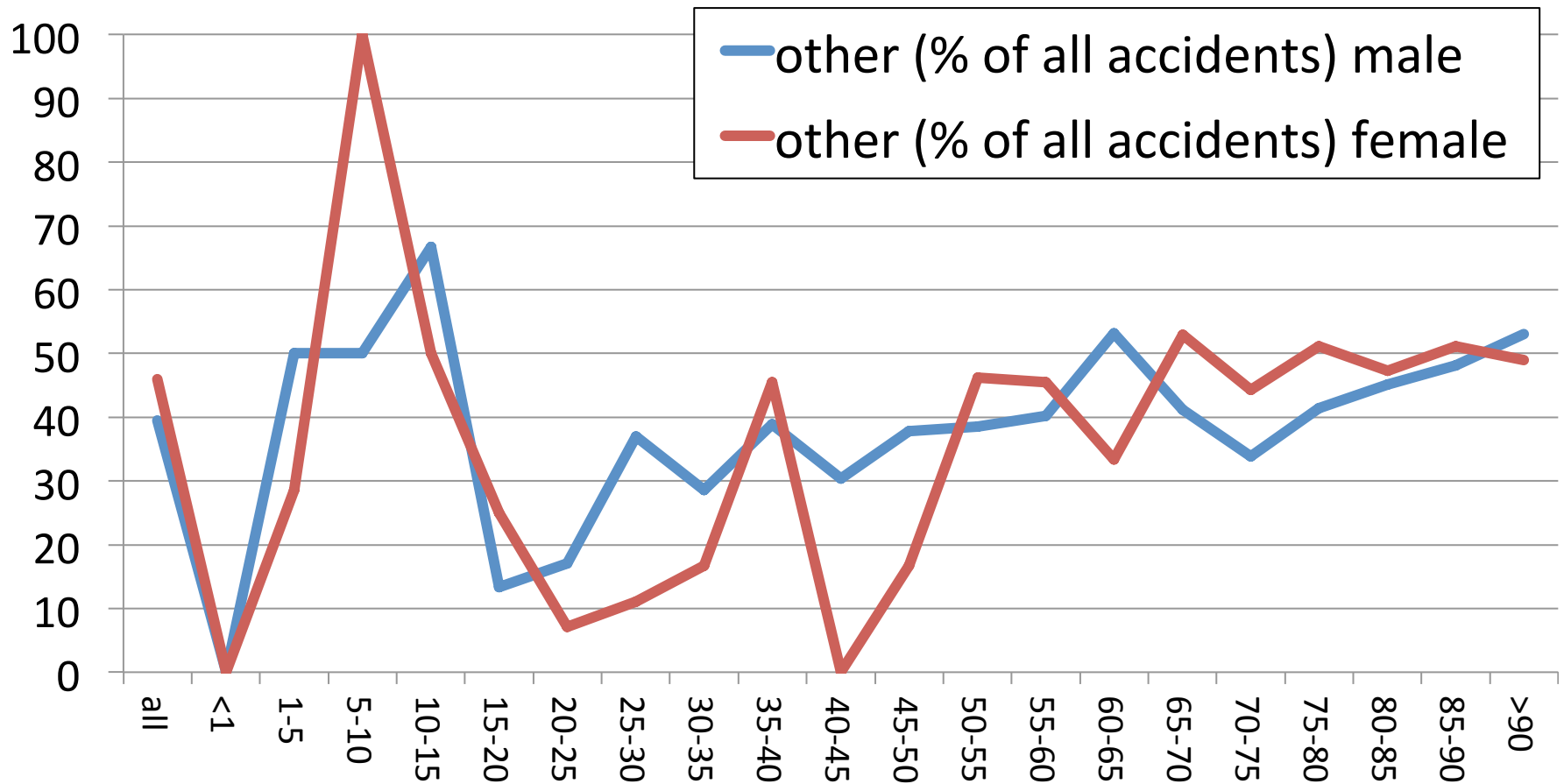
# % of Deaths due to traffic accidents



# % of Deaths due to falls



# % of Deaths due to Other Causes





# Prehospital vs. Hospital Deaths

In 2009 there were

- A total of 4291 deaths due to external causes
- A total of 1872 (44%) hospital deaths due to external causes
- A total of 2419 (56%) prehospital deaths due to external causes

# Hospital Treatment

2000

Cause	gender	hospital care			age			
		total	died	% Mort	0-14	15-44	45-64	65+
All cases	total	2.672.253	39.443	<b>1,476</b>	196.666	644.240	729.245	1.102.102
	male	1.224.864	19.552	<b>1,596</b>	113.109	260.337	368.806	482.612
	female	1.447.389	19.891	<b>1,374</b>	83.557	383.903	360.439	619.490
external causes	total	270.648	1.872	<b>0,692</b>	28.327	89.145	63.319	89.857
	male	144.213	918	<b>0,637</b>	16.944	61.347	35.777	30.145
	female	126.435	954	<b>0,755</b>	11.383	27.798	27.542	59.712
external causes (% of all)	total	<b>10,13</b>	<b>4,75</b>		<b>14,40</b>	<b>13,84</b>	<b>8,68</b>	<b>8,15</b>
	male	<b>11,77</b>	<b>4,70</b>		<b>14,98</b>	<b>23,56</b>	<b>9,70</b>	<b>6,25</b>
	female	<b>8,74</b>	<b>4,80</b>		<b>13,62</b>	<b>7,24</b>	<b>7,64</b>	<b>9,64</b>

Q: STATISTIK AUSTRIA, Spitalsentlassungsstatistik. - Erstellt am 15.11.2010.

# Prevention of work-related trauma

**AUVA** spends approx. **70 mio. Euro annually** to prevent work-related accidents by

- Training of safety officers
- Training of „first aid“ providers (1 in 8 workers mandatory)
- Mandatory safety evaluation of workplace
- Increasing awareness using brochures, CDs, etc

# Prevention of traffic-related trauma

- Mandatory seat-belt (mid-1980s) and helmet (mid-1990s) laws
- Lower legal alcohol limit (0.5 prom.; 1995)
- Speed limits
- Increased traffic reduced high-speed accidents
- Better roads
- Better cars (crash-safe cell, airbag, ABS, etc.)

# Other factors

- Percentage of people aged 15-30 decreased (i.e. the high-risk group is smaller)
- Increased use of public transport (e.g. Vienna subway system: 1,9 mio passengers/day)
- Increase in „risk-averse“ behavior (?)
- Loss of high-risk manual jobs to low-cost countries

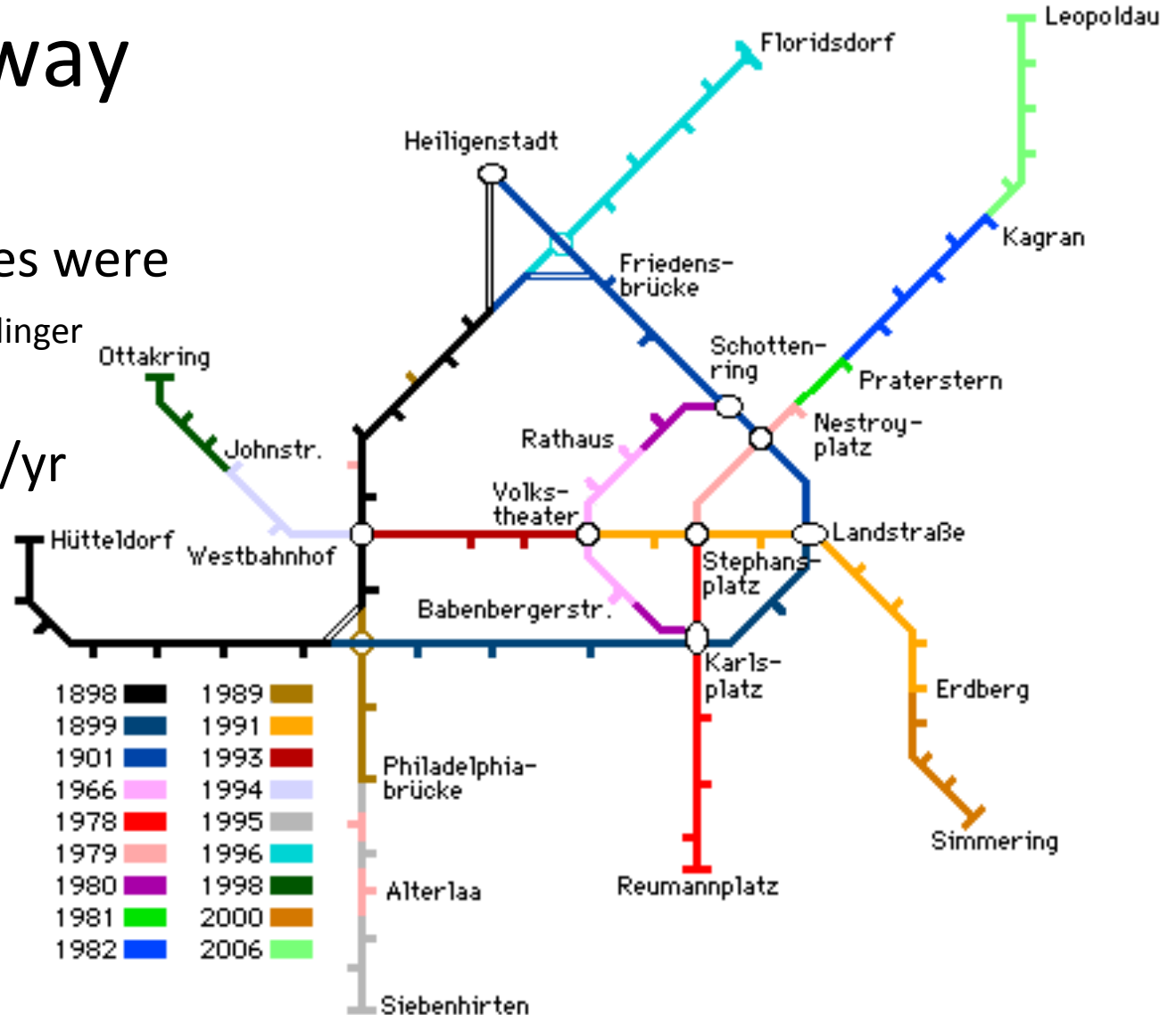
# Vienna Subway

## System:

Years when new lines were completed ©: Horst Prillinger

700 mio passengers/yr

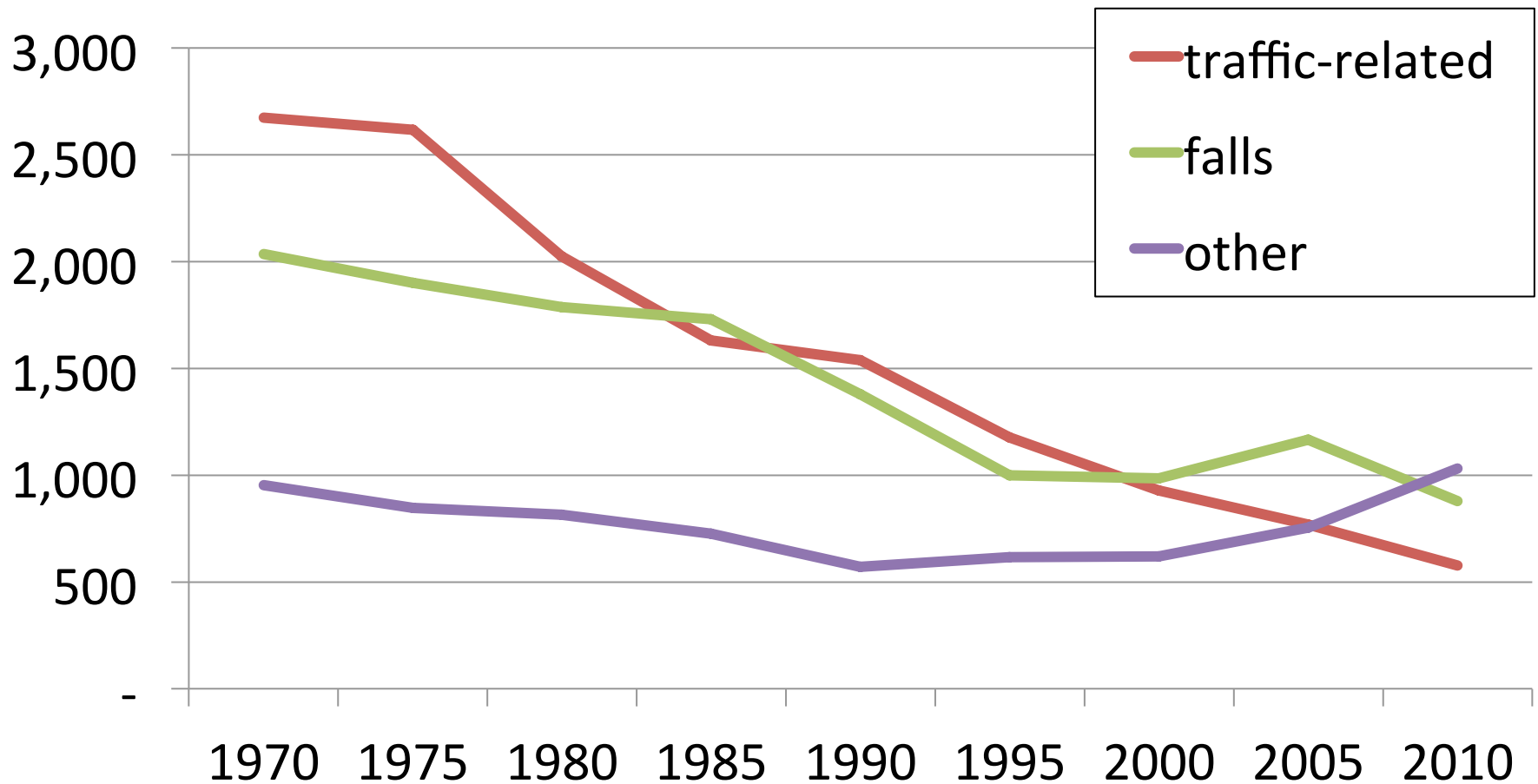
1,9 mio pass./day



# Effects of Prevention (+ other factors)

Cause	1970	1975	1980	1985	1990	1995	2000	2005	2010
total deaths	<b>98.819</b>	<b>96.041</b>	<b>92.442</b>	<b>89.578</b>	<b>82.952</b>	<b>81.171</b>	<b>76.780</b>	<b>75.189</b>	<b>77.199</b>
Ext. causes	7.710	7.471	6.890	6.450	5.576	4.896	4.399	4.439	4.200
% ext.	<b>7,80</b>	<b>7,78</b>	<b>7,45</b>	<b>7,20</b>	<b>6,72</b>	<b>6,03</b>	<b>5,73</b>	<b>5,90</b>	<b>5,44</b>
traffic	2.675	2.617	2.027	1.633	1.539	1.178	927	768	577
falls	2.036	1.901	1.786	1.729	1.378	999	987	1.166	878
other	955	848	814	725	571	618	619	755	1.030
intox.	112	83	67	82	79	160	122	21	29
suicide	1.789	1.813	1.932	2.091	1.825	1.785	1.586	1.392	1.261
violence	111	123	91	107	125	84	75	67	45
unknown	9	76	159	60	40	55	60	82	198

# Lethal Accidents 1970 - 2010



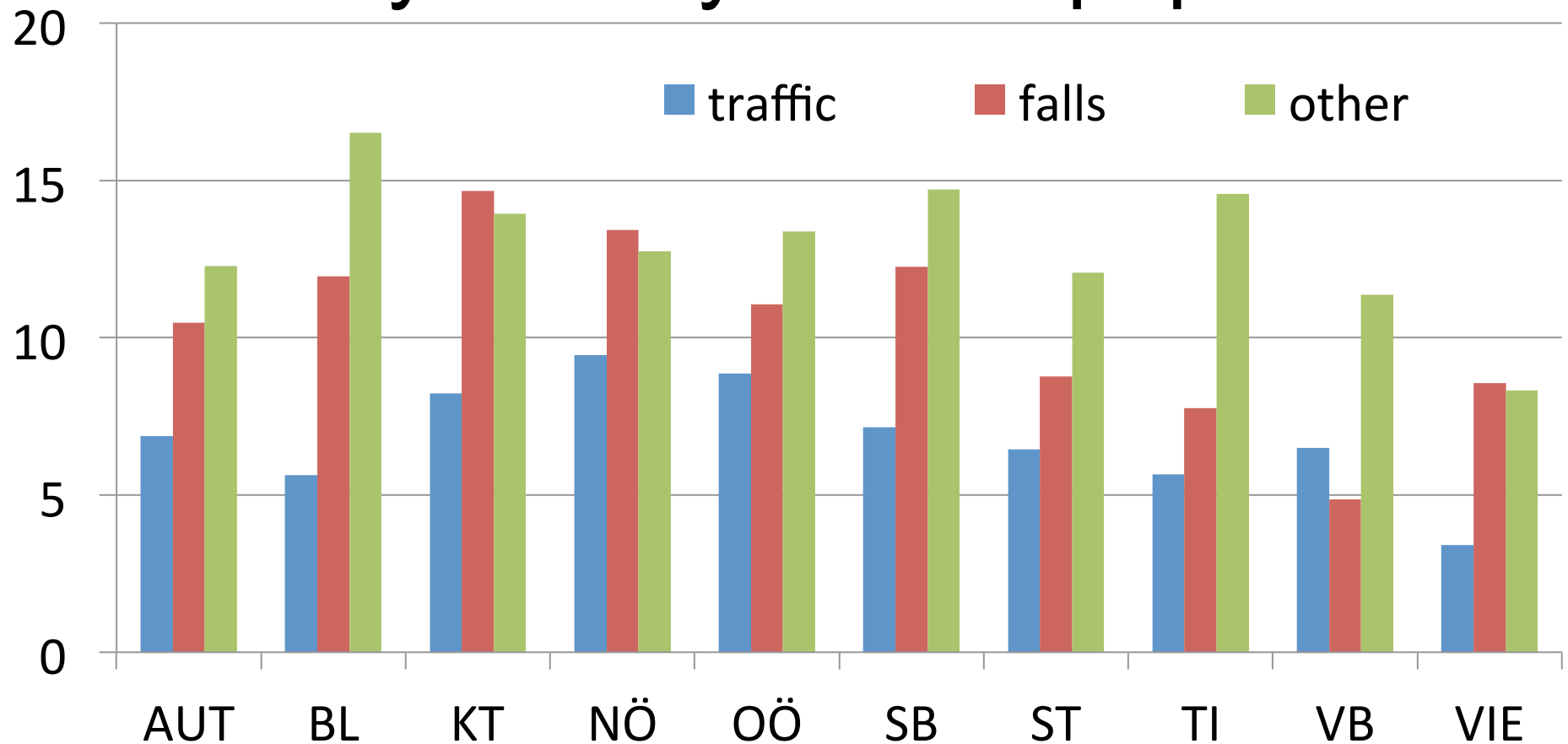


## Trauma Deaths 2010 by county and 100.00 population

Cause	Austria	BL	KT	NÖ	OÖ	SB	ST	TI	VB	VIE
<b>ALL</b>	<b>50,07</b>	<b>51,3</b>	<b>63,3</b>	<b>55,29</b>	<b>52,97</b>	<b>58,8</b>	<b>49,2</b>	<b>46,5</b>	<b>41,41</b>	<b>39,46</b>
Traffic	6,88	5,63	8,23	9,44	8,85	7,16	6,45	5,65	6,5	3,4
Falls	10,47	12	14,7	13,42	11,05	12,25	8,77	7,77	4,87	8,56
Intoxi- cation	0,35	0,35	0,54	0,37	0,21	0	0,33	0	0	0,7
Other	12,27	16,5	14	12,74	13,38	14,7	12,07	14,57	11,37	8,33
Suicide	15,03	13,7	19,7	14,29	15,08	18,28	17,45	12,72	15,16	12,61
Violence	0,54	0,7	0,54	0,5	0,78	0,19	0,17	0,14	0,27	0,94
Not known	2,36	1,41	2,15	1,93	1,49	3,96	2,07	4,24	0,54	3,05

Q: STATISTIK AUSTRIA, Todesursachenstatistik. Erstellt am: 01.08.2011.

# Deaths due to Accidents 2010 by County/100.00 pop.



# Traffic-related Trauma

Outcome	Injuries				Deaths			
Year	2007	2008	2009	2010	2007	2008	2009	2010
Motorbike	9580	9319	9156	8142	120	116	117	86
Car	30983	28945	28136	26770	378	367	328	292
Bus (public transport)	437	362	385	405	0	0	0	0
Bus (other)	293	331	312	301	4	2	2	8
Truck <3.5 t	860	822	788	754	15	19	13	10
Truck >3.5 t	405	348	288	280	11	3	9	7
Tractor	134	136	162	149	9	6	13	8
Bike	5775	5559	5417	4835	37	62	39	32
Pedestrian	4201	4233	3995	3722	108	102	101	98
Other	543	466	519	500	9	2	11	11
<b>total</b>	<b>43631</b>	<b>41202</b>	<b>40002</b>	<b>37716</b>	<b>571</b>	<b>563</b>	<b>516</b>	<b>466</b>

# Work-related trauma

Year	All cases			work-related		traffic to work	
	n	deaths	Female (%)	n	deaths	n	deaths
1975	208.417	856	.	185.605	636	20.209	206
1980	224.950	654	.	199.762	461	22.984	186
1990	209.349	466	19,4	188.870	337	18.246	111
1995	183.226	449	20,5	163.677	311	17.965	129
2000	144.953	316	22,3	130.239	232	13.198	71
2005	138.640	374	24,3	123.143	218	14.076	86
2009	137.569	360	28,5	121.979	180	13.658	79

Q: Hauptverband der österreichischen Sozialversicherungsträger. Erstellt am: 29.09.2010.

 Missing numbers: cases of occupational diseases

# Effects: Summary 1970 - 2010

- Significant decrease in accidents
  - Lower number & percentage of traffic accidents
  - Lower number & percentage of falls
  - Decrease in work-related trauma
- No significant decrease in other accidents

# Impact on Trauma Care?

What is the impact of these changes in epidemiology of trauma on hospital admissions for trauma?

- Decrease in patient numbers
- Changes in age distribution
  - Older patients with medical problems plus minor trauma
- Changes in trauma severity

# Trauma System in Austria

- Good EMS, >30 helicopters
- 3 university departments of traumatology
- 7 free-standing trauma hospitals
- 65 trauma departments at larger hospitals
- <100 surgical departments that also treat trauma occasionally

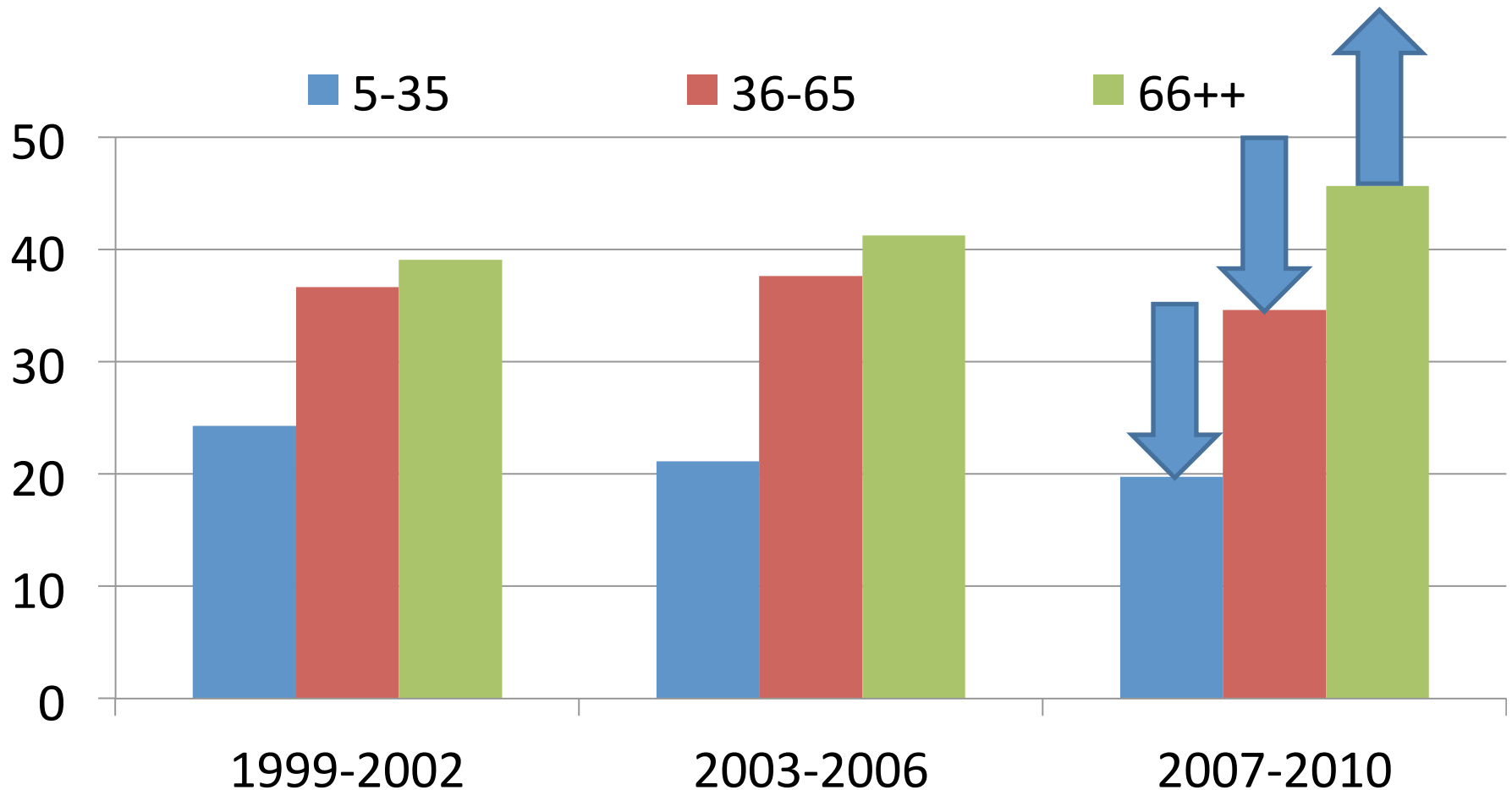
**These departments see fewer patient every year**

# Analysis TCLB 1999 - 2010

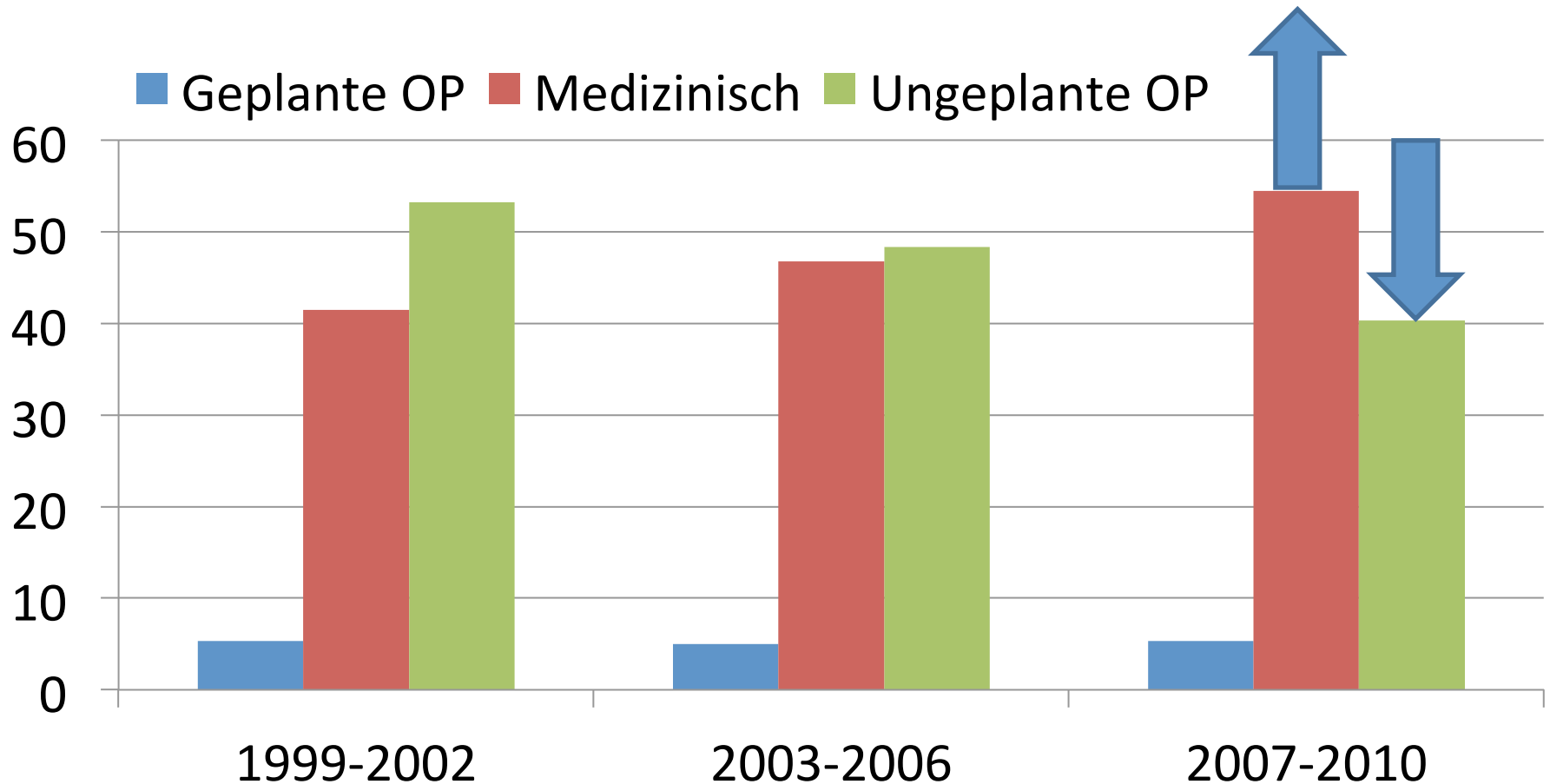
- 12 years: 3184 ICU admissions (excl. postop. cases < 24 h); 241 – 289 pts./year who really needed ICU treatment
- Analysis of age & gender distribution, admission diagnosis, trauma severity, and outcome for three 4-year periods:  
1999-2002, 2003-2006, 2007-2010



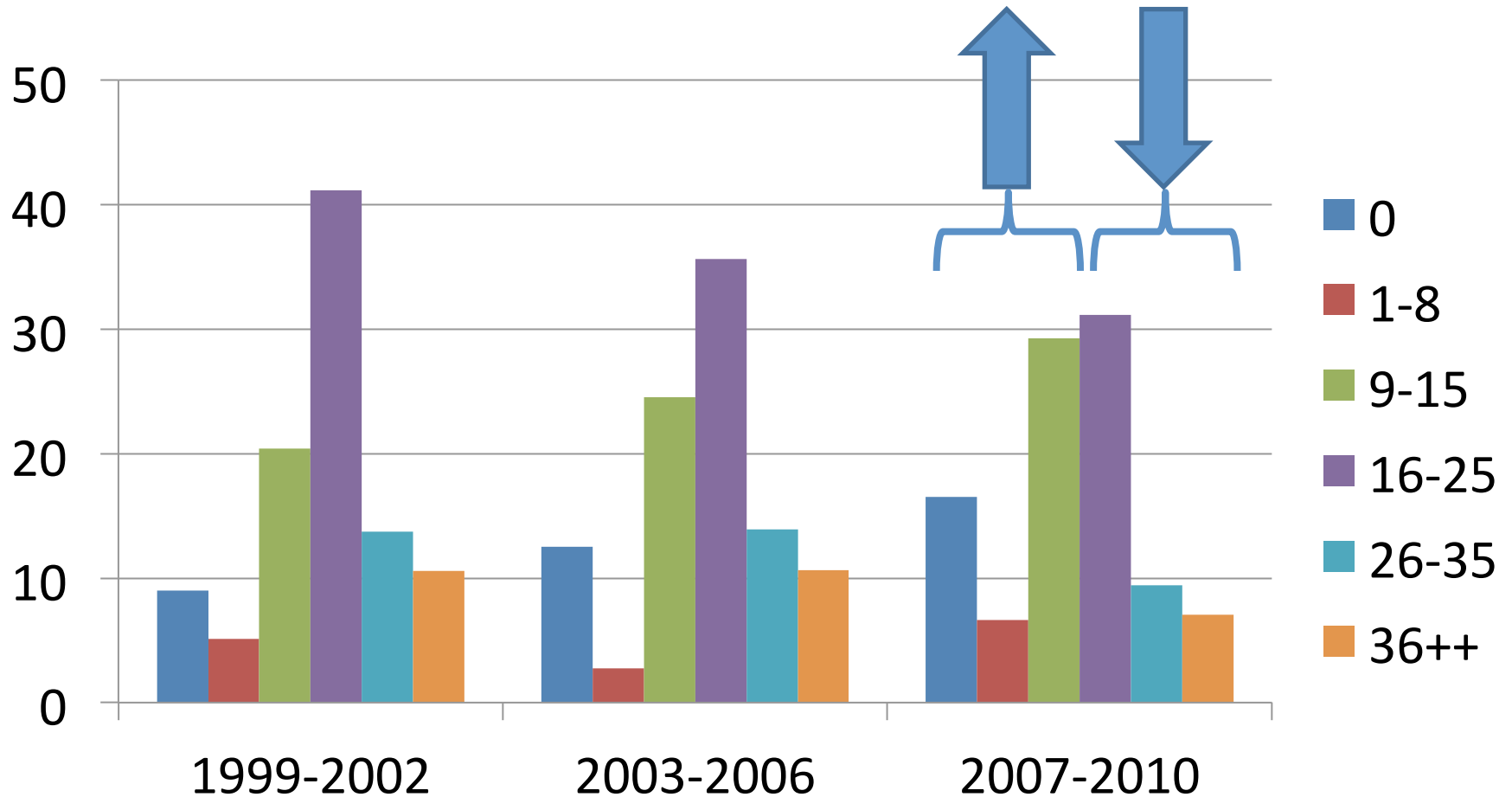
# Age Distribution (%)



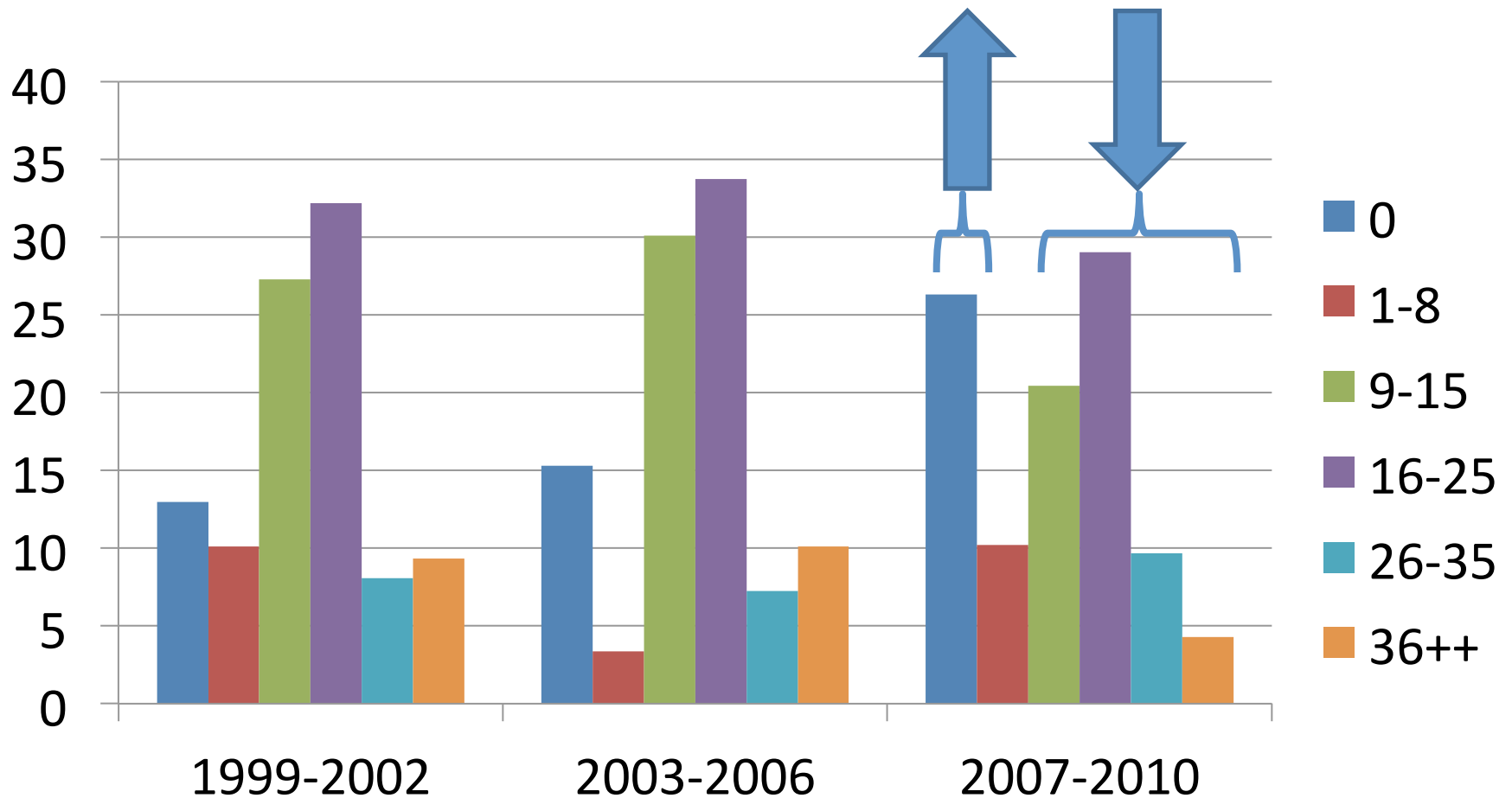
# Admission Diagnosis



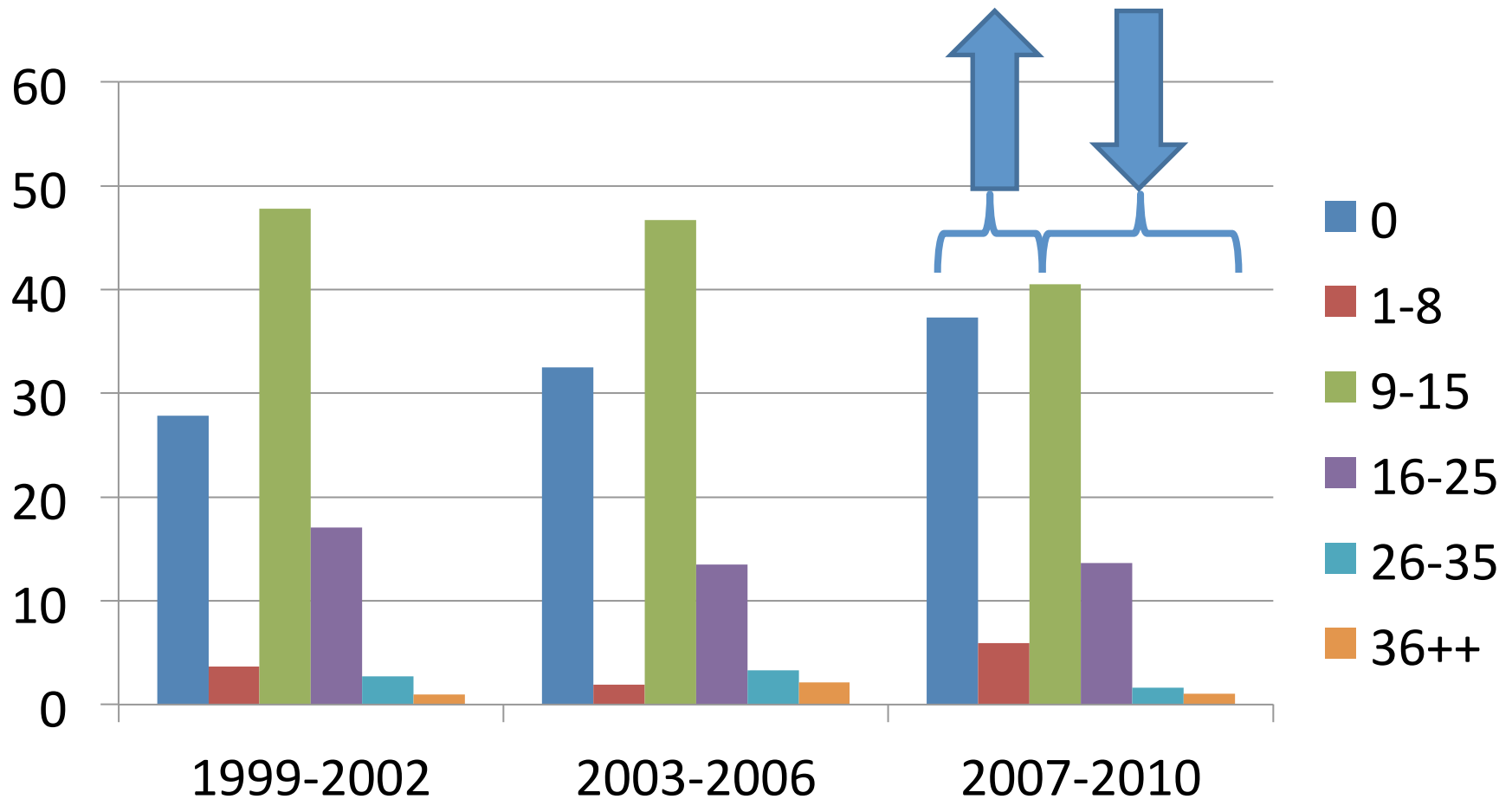
# Trauma Severity (ISS; 5-35a)



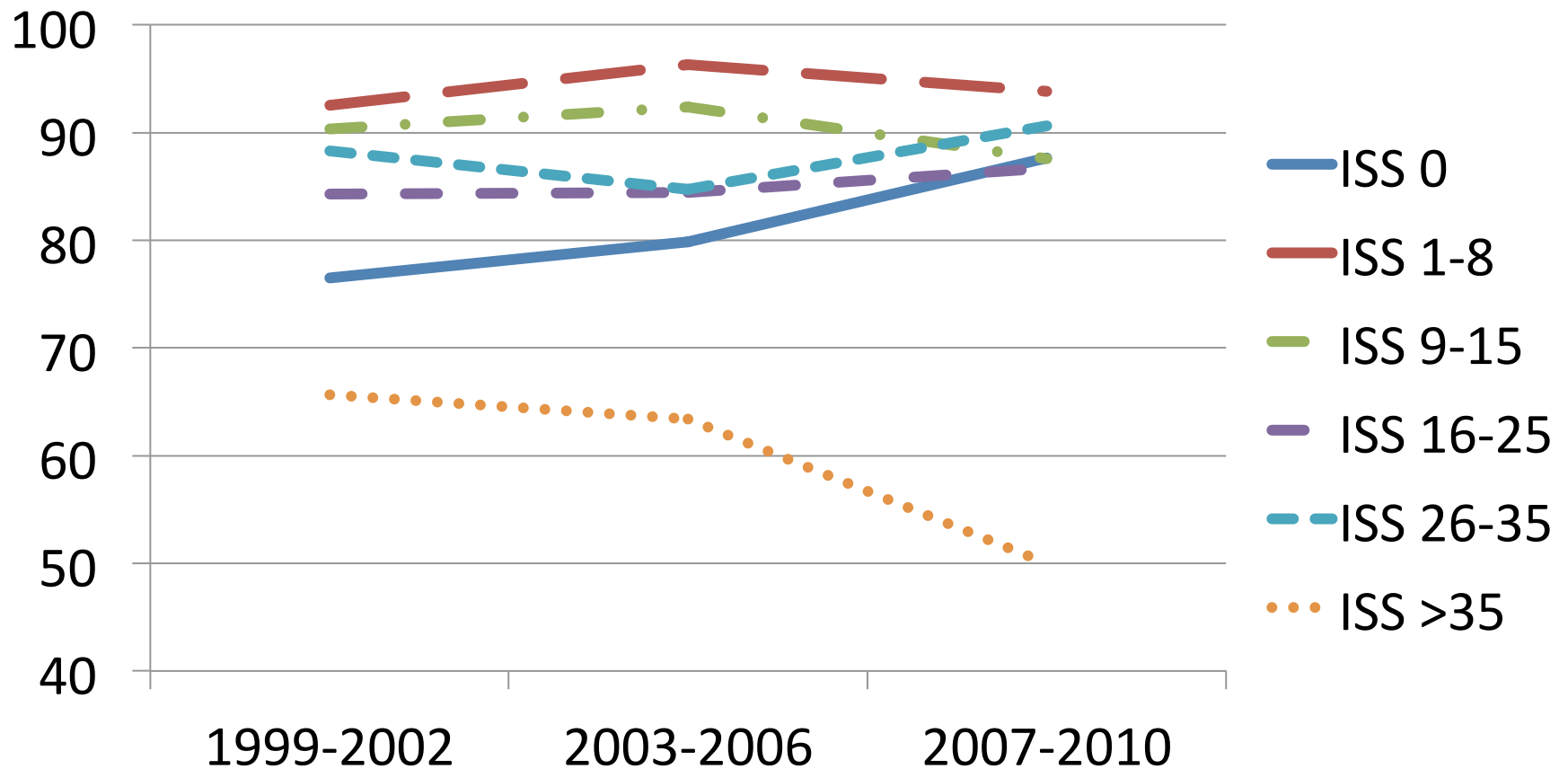
# Trauma Severity (ISS; 36-65a)



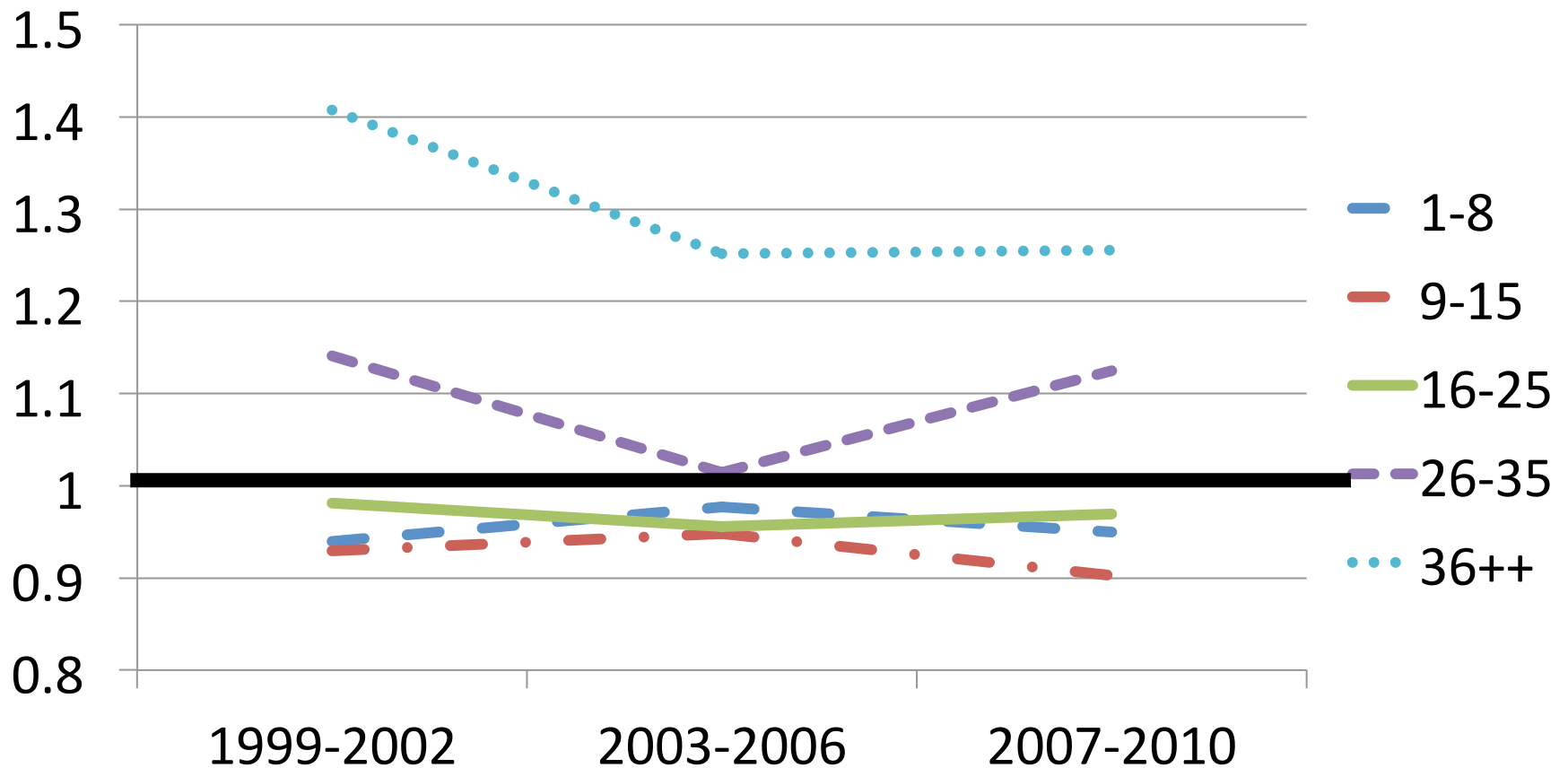
# Trauma Severity (ISS; >66 a)



# Hospital Survival



# Observed vs. Expected Survival



# Trauma Care: Facts

- Seriously injured patients should be treated in designated trauma centers
- Trauma centers should admit at least 250 patients with ISS >16 per year, and should admit at least 30 patients with severe TBI (GCS <9) per year
- **Lower numbers of patients are associated with increased mortality**



# The Relationship Between Annual Hospital Volume of Trauma Patients and In-Hospital Mortality in New York State

*William H. Marx, DO, FACS, Ronald Simon, MD, FACS, Patricia O'Neill, MD, FACS, Marc J. Shapiro, MD, FACS, Arthur C. Cooper, MD, FACS, Louise Sztpulski Farrell, MS, Jane E. McCormack, RN, BSN, Palmer Q. Bessey, MD, FACS, MS, and Edward Hannan, PhD, MS*

**Results:** The adjusted odds of in-hospital mortality patients in centers with a mean annual volume of less than 2,000 patients was significantly higher (adjusted odds ratio = 1.46, 95% confidence interval, 1.25–1.71) than the odds for patients in higher volume centers. The adjusted odds of mortality for patients in centers with an American College of Surgeons-recommended annual volume of less than 240 patients with an ISS of at least 16 was 1.41 times as high (95% confidence interval, 1.17–1.69) as the odds for patients in higher volume centers. However, for both volume cohorts analyzed, the

Walter Mauritz  
Heinz Steltzer  
Peter Bauer  
Lorenz Dolanski-Aghamanoukjan  
Philipp Metnitz

## Monitoring of intracranial pressure in patients with severe traumatic brain injury: an Austrian prospective multicenter study

Compared with the large centers, ORs  
for hospital mortality were 1.85 (CI  
1.42–2.40) for patients from medium-  
sized centers and 1.91 (CI 1.24–2.93)  
for patients from small centers.

# Consequences for Trauma Care

- Decrease in severe trauma cases requires **centralisation of trauma care:**
  - As few centers as possible (max. 1/500.000 pop.)
  - Rapid transport – requires helicopter service
  - Improved prehospital care to reduce number of out-of-hospital deaths

# Consequences for Trauma Care

- Increasing age of trauma patients requires **special wards for „geriatric trauma care“**
  - Predominantly medical problems (cardiac, pulmonary, renal) in patients with minor (orthopedic) trauma
- **Specialized ortho rehab** for geriatric patients
- **Prevention** should focus on geriatric patients (safety checks for homes)

# Possible Lessons for Slovakia

- Public Health: Check status quo!
- Expect similar effects of prevention and other factors over the next 10-25 years
- Start designing a trauma system that will improve outcomes for the most seriously injured patients
  - Rapid transport to
  - Few, well equipped centers

# Thank You for Your Attention!

Full presentation available from

[walter.mauritz@igeh.org](mailto:walter.mauritz@igeh.org)