Results, Retrospectively Analysed, of the Current Trauma Database in Curacao, Dutch Caribbean

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ABSTRACT

Background: *A trauma registry plays an important role in the process of health-service improvement. The organization of trauma care in the Caribbean is limited; there is a lack of registry and distribution of patients.*

Objective: *The purpose was to compare incidence-trends of patients with trauma-related injuries in the Curacao trauma registry over 14 years, since Curacao is part of the Dutch Caribbean.*

Methods: *The data of all injured patients admitted to the Emergency Department (ED) from January 1, 2000 to December 31, 2013, were retrospectively analysed using a prospective trauma registry. Subsequently, they were crosschecked with the registry of Central Bureau of Statistics, Curacao (CBSC).*

Results: *In the ED, 14 886 patients with trauma-related injuries were selected: 9390 M and 5496 F. The incidence per 100 000 inhabitants per year of traffic-related trauma was 529.7 (95% confidence interval [CI]:430.9, 628.5); firearm-related 29.2 (95% CI: 18.3, 40.2); stab wound-related 26.4 (95% CI: 18.4, 34.4) and molestation-related 173 (95% CI: 127.5, 218.5). There is an overall decline in the incidence through the years. In all the trauma-related groups, there were significantly more men and people aged between 15 and 34 years. The hospitalization of traffic-related injured patients was 22.7%, firearm-related 48.3%, stab wound-related 30.5% and molestation-related 18.9%.*

Conclusion: *The hospitalizations percentages differ. The incidence and trauma mechanism seem to be age- and gender-related. There is a higher incidence of trauma-related injuries, in Curacao compared with the incidence in the other countries in the region. This study is a start to the set-up of a new trauma registry.*

Keywords: Incidence, results trauma registry

Resultados Analizados Retrospectivamente de la Actual Base de Datos de Traumas en Curazao, Caribe holandés

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RESUMEN

Antecedentes: *El registro de trauma desempeña un papel importante en el proceso de mejora de los servicios de salud. La organización de la atención al trauma en el Caribe es limitada. Hay falta de registro y distribución de los pacientes.*

Objetivo: *El propósito fue comparar las tendencias de la incidencia de pacientes con lesiones relacionadas con traumas en el registro de traumas de Curazao por 14 años, ya que Curazao es parte del Caribe holandés.*

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Métodos: *Los datos de todos los pacientes heridos ingresados en el Departamento de Emergencias (DE) del 1° de enero de 2000 al 31 de diciembre de 2013, se analizaron retrospectivamente mediante un registro prospectivo de traumatismos. Posteriormente, se cotejaron con el registro de la Oficina Central de Estadísticas, Curazao (CBSC, siglas en inglés).*
Resultados: *En el DE se seleccionaron 14 886 pacientes con lesiones relacionadas con traumas: 9390 V y 5496 H. La incidencia por 100 000 habitantes por año de traumas relacionados con el tráfico fue 529.7 (95% intervalo de confianza [IC]:430.9, 628.5); 29.2 relacionados con armas de fuego (95% IC:18.3, 40.2); 26.4 relacionados con herida por apuñalamiento (95% IC:18.4, 34.4), y 173 relacionadas con abuso sexual (95% IC: 127.5, 218.5). Hay una disminución general en la incidencia a través de los años. En todos los grupos relacionados con traumas, hubo significativamente más hombres y personas de entre 15 y 34 años. La hospitalización de pacientes relacionados con el tráfico fue 22.7%, relacionados con armas de fuego 48.3%, relacionados con heridas por apuñalamiento 30.5%, y relacionados con abuso sexual 18.9%.*
Conclusión: *Los porcentajes de hospitalizaciones difieren. La incidencia y el mecanismo de los traumas parecen estar relacionados con la edad y el género. Hay una mayor incidencia de lesiones relacionadas con traumas en Curazao, en comparación con la incidencia en los otros países de la región. Este estudio es un comienzo para la puesta en marcha de un nuevo registro de traumas.*

Palabras claves: Incidencia, registro de trauma, resultados

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BACKGROUND

A trauma registry is very important for patients, the hospitals and countries. A thorough registration of trauma patients provides a solid health system and reduces the number of preventable deaths due to trauma (1). Every year, millions of people around the world die or are hospitalized due to fatal and non-fatal trauma. According to the World Health Organization (WHO), injuries caused by traffic accidents, firearms, molestation, cut and stab wounds are the major causes of mortality and morbidity worldwide (2–4).

In Curacao, the number, type, variety of injuries by external trauma is relatively unknown. Despite the extent and consequences, systematic collection and the organization of trauma care in the Dutch Caribbean are limited. There is a lack of efficient trauma registry and distribution of trauma patients after disaster. Trauma-related injury rates in Curacao, as a Caribbean country within the Kingdom of The Netherlands, differ from those in Europe.

The purpose of this study is to determine incidence-trends of trauma patients in the St Elisabeth Hospital (SEHOS), being the only hospital providing trauma care 24/7 nationwide; and secondly to audit and possibly improve the current treatment of trauma patients and hospital management, comparing the outcomes with those of the other countries. The SEHOS produces nationwide injury mechanism, age, time and gender-specific data on trauma-related injuries, which presented in the ED.

SUBJECTS AND METHODS

Background data on Curacao

Curacao is an independent country within the Kingdom of the Netherlands. It has a population of approximately, 150 000 with a gross national product (GNP) per capita of 15 409 dollar in 2011. For every 100 females, there are 84.2 males in Curacao (5, 6). The SEHOS, Willemstad, is the only hospital beside two private (day) clinics in Curacao. The Netherlands has a population of almost 17 million and a GNP per capita of 41 949 dollar in 2011. For every 100 females, there are 98.0 males in The Netherlands (7, 8).

Study design, setting and selection of participants

The hospital prospective trauma registry is used to analyse retrospectively all the patients who were admitted to this hospital in the last 14 years, from January 1, 2000 up to December 31, 2013. The data on trauma-related injuries were obtained from the National Hospital Financial Discharge Register, Curacao. The patients were identified using a comprehensive prospective trauma registry, in which the demographical data, trauma

mechanism, reference, location of injury, hospitalization, Intensive Care Unit (ICU) admission, discharge (to elsewhere: home, general practitioner, *etc*) and mortality were retrospectively registered. All the patients had a unique personal identification number, which made it possible to examine each patient during the recorded admission. Several admissions of single patients were included, but only if the day of admission was different. When a patient was not registered according to one of the four trauma mechanisms (traffic, firearm, stab wound, molestation), the patient was excluded. To investigate the incidence trends, the relations among time, age and different mechanisms of injuries, all the cases were classified into different groups by trauma mechanism.

Methods of measurement and primary analysis

The main outcome measures were: ED presenting time in years, direct hospital discharge, hospitalization, IC admission and mortality (only patients who died in the ED or were dead on arrival). We have calculated the overall incidence rates per 100 000 inhabitants per year to compare the outcomes with those of other countries. The population data were obtained from the CBSC, the official population registry of the country (5). The total population differs between 2000 and 2013 from 136 969 to 152 760 official inhabitants. The sum of the inhabitants per year was used, when calculating the cumulative incidence over the 14 years. The cumulative incidence over 14 years was 140 213.214. The hospital's trauma database was subsequently crosschecked with the registry of CBSC. The statistical calculations were computed using the SPSS 20.0.0 for Mac statistical software package. Descriptive statistics, χ^2-test and confidence interval (CI) were used to compare the proportions and the incidence rates. For continuous variables between different groups, analysis of variance (ANOVA)-test was used as appropriate; p-values < 0.05 were considered statistically significant with a CI of 95%. Tukey's test, *post-hoc*, is used to investigate the variance between many groups. When Levene's test was significant, the *post-hoc* Games-Howell test was applied.

Compliance with Ethics Guidelines Statement

The Medical Ethics Committee Curacao approved this retrospective study based on a prospective registration of the National Hospital Financial Discharge Register Curacao. All the procedures followed in this study, involving human participants, were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

RESULTS

Incidence results

In 14 years, 14 886 trauma-related injury patients were seen in the ED (9390 males and 5496 females). There were 10 392 patients with traffic-related, 3396 molestation-related, 574 firearm-related and 518 stab wound-related trauma registered. For every 100 000 inhabitants, there were 7415.8 patients with traffic-related; 2422 molestation-related; 409, firearm-related and 369.4 stab wound-related trauma. Over the last 14 years, the incidence per 100 000 inhabitants per year of traffic-related trauma presenting to the ED was 529.7 (95% CI: 430.9, 628.5), firearm-related 29.2 (95% CI: 18.3, 40.2), stab wound-related 26.4 (95% CI: 18.4, 34.4) and molestation-related 173 (95% CI: 127.5, 218.5). There is an overall decline in the incidence over 14 years in all the groups ($p < 0.001$), but the decline was not linear and seems to increase (Table 1, Fig. 1).

Follow-up results

The average hospitalization rates of all traffic-related trauma was 22.7% with a mean of 168.5 per year (95% CI: 145.9, 191.1), beside those, 9.0 patients went to the ICU and 3.6 per year to the mortuary. Hospitalization, including ED to ICU, varied over the years, in the last years there was an increase. Of all the 7415.8 traffic-related trauma patients per 100 000 people were 1.3 times more men (n = 4256.4) than women (n = 3159.5) [$p = 0.025$]. Among young people, aged 15–24 years (n = 1957.7), was the highest incidence ($p < 0.001$). In total, 48.3%, with a mean of 19.8 per year (95% CI: 13.9, 25.6) of all the firearm-related trauma (total n = 574n/ 100000 = 409.4) were hospitalized per year. Each year 1.9 people had to go to the ICU and 2.5 died in the ED or were Dead On Arrival (DOA). The hospitalization numbers, including ICU, are stable over the years. With a mean of 2.5 dead per year in the ED, there is an in-hospital mortality of 6.1%. Significantly, more men (n = 370.9) than women (n = 38.5, $p < 0.001$), 9.6 times, were in the ED with gunshot wounds per 100 000 inhabitants. People, aged 15–24 years and 25–34 years, were most commonly seen ($p < 0.001$). Stab wound-related hospitalizations were 30.5% of the 518 people in total with a mean of 11.3 per year (95% CI: 7.6, 15.0). The total hospitalized patients and patients who went to the ICU from the ED were steady over the years. In total, 4.0 times more

Table 1: Trauma-related injuries at the ED in Curacao from 2000 to 2013, rate per 100 000 patients

	Traffic		Firearm		Stab wound		Molestation	
YEAR	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)	n	Percentage (%)
2000	781.7	10.5	32.1	7.8	48.5	13.2	266.0	11.0
2001	767.4	10.3	22.1	5.4	46.4	12.5	253.2	10.5
2002	669.7	9.0	44.9	11.0	35.7	9.7	241.1	10.0
2003	653.3	8.8	72.7	17.8	43.5	11.8	268.2	11.1
2004	599.1	8.1	59.9	14.6	30.0	8.1	250.3	10.3
2005	546.3	7.4	42.8	10.5	25.0	6.8	196.8	8.1
2006	611.2	8.2	14.3	3.5	17.1	4.6	163.3	6.7
2007	545.6	7.4	25.0	6.1	35.7	9.7	212.5	8.7
2008	527.8	7.1	19.3	4.7	22.8	6.1	156.9	6.5
2009	474.3	6.4	15.0	3.7	20.7	5.6	113.4	4.7
2010	278.9	3.8	10.7	2.6	11.4	3.1	64.2	2.7
2011	243.9	3.3	15.0	3.7	6.4	1.7	54.2	2.2
2012	298.8	4.0	17.1	4.2	12.1	3.3	77.0	3.2
2013	417.9	5.6	18.5	4.5	14.3	3.9	104.8	4.3
ALL	7415.8		409.4		369.4		2422.0	
p-Value	< 0.001		< 0.001		< 0.001		< 0.001	
Mean/y	529.7		29.2		26.4		173.0	
95% CI	(430.9 – 628.5)		(18.3 – 40.2)		(18.4 – 34.4)		(127.5 – 218.5)	

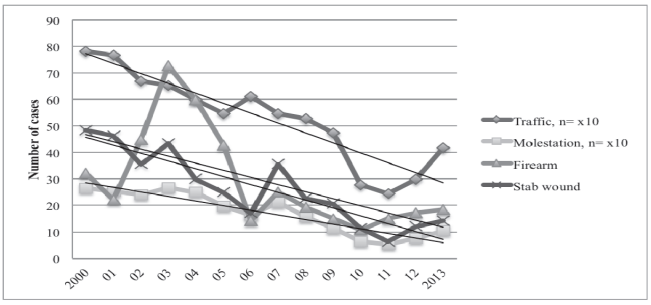

Fig. 1: Trauma-related injuries presenting to the ED per 100 000 inhabitants in Curacao from 2000 to 2013.

males (n = 295.3) than females (n = 74.2, $p < 0.001$) were stab wound-related victims per 100 000 people. Every year 0.57 goes to the ICU and 0.64 directly to the mor-tuary. The highest incidence was among young people, aged 25–34 years ($p < 0.001$). Molestation-related trauma occurred 2 422 times per 100 000 inhabitants (total n = 3396) 1774.4 men and 647.6 women. Hospitalization rates were quite stable and even an overall decline, but in the last years there has been an increase. Men were 2.7 times more often victim, compared with women ($p < 0.001$). In total, 18.9% were hospitalized with a mean of 45.8 per year (95% CI: 35.3, 56.2). All trauma-related in-juries were highest among people aged 25–44 years [$p < 0,001$] (Table 2, Table 3, Fig. 2).

Table 2: Trauma-related injury presenting to the ED and follow-up in Curacao from 2000 to 2013

	Traffic	Firearm
n (total)	10 398	574
	Mean/year (95% CI)	Mean/year (95% CI)
Hospitalization, Ward	168.5 (145.9 – 191.1)	19.8 (13.9 – 25.6)
Hospitalization, IC	9.0 (6.6 – 11.4)	1.9 (0.80 – 2.9)
Mortuary	3.6 (2.0 – 5.1)	2.5 (0.81 – 4.2)
Elsewhere	561.6 (431.3 – 692.0)	16.6 (8.8 – 24.9)
	Stab wound	**Molestation**
n (total)	518	3396
	Mean/year (95% CI)	Mean/year (95% CI)
Hospitalization, Ward	11.3 (7.6 – 15.0)	45.8 (35.3 – 56.2)
Hospitalization, IC	0.57 (0.20 – 0.9)	2.8 (1.5 – 4.1)
Mortuary	0.64 (0.21 – 1.1)	3.1 (1.2 – 5.1)
Elsewhere	24.5 (15.7 – 33.3)	190.9 (137.6 – 244.1)

With *post-hoc* tests was a significant lower total number of trauma with the age range ‘0 to 14’ and above 54 years old, in all trauma groups ($p < 0.05$, Table 3).

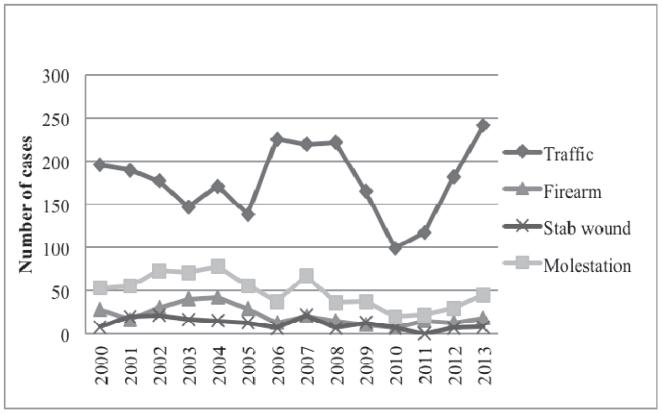

Fig. 2: Trauma-related injury presenting to the ED and hospitalized patients (including ED to IC) in Curacao from 2000 to 2013.

DISCUSSION

The current study provides information about the safety situations in Curacao. In one decade, all the investigated trauma-related injuries have declined. Cars are saver than ever; there is less violence-related trauma, although an increase in both trauma-related injuries has been seen in the last few years.

The World Health Organization (WHO) reported a decline in traffic-related deaths in Curacao in the last decade, but in the last few years those are equal or have even increased, based on the information of CBSC (5, 9). Traffic-related mortality in Curacao is comparable with that in the other countries in the region and in the United States of America (USA). But there is a large variation between Curacao and European countries, like the Netherlands (9). In the last few years, there were 8.6 up to 19.9

Table 3: Trauma-related injury presenting to the ED per 100 000 inhabitants in Curacao from 2000 to 2013

Traffic	**n**	**%**	**Mean/year (95% CI)**	**Rate/100 000 persons**	***p*-Value**
Gender					
Male	5,968	57.4	426.3 (345.3 – 507.3)	4,256.4	
Female	4,430	42.6	316.4 (257.9 – 374.9)	3,159.5	0.025
Age					
0 – 14	907	8.7	64.8 (46.2 – 83.4)	646.9	
15 – 24	2,745	26.4	196.1 (160.1 – 232.0)	1,957.7	
25 – 34	2,465	23.7	176.1 (138.0 – 214.2)	1,758.0	
35 – 44	1,884	18.1	134.6 (109.3 – 159.9)	1,343.7	
45 – 54	1,301	12.5	92.9 (77.0 – 108.8)	927.9	
> 54	1,096	10.5	78.3 (65.9 – 90.7)	781.7	
All	10,398			7,415.8	< 0.001
Firearm	**n**	**%**	**Mean/year (95% CI)**	**Rate/100 000 persons**	***p*-Value**
Gender					
Male	520	90.6	37.1 (23.6 – 50.7)	370.9	
Female	54	9.4	3.9 (1.6 – 6.2)	38.5	< 0.001
Age					
0 – 14	6	1.0	0.4 (-0.1 – 0.9)	4.3	
15 – 24	185	32.2	13.2 (8.9 – 17.5)	131.9	
25 – 34	171	29.8	12.2 (6.2 – 18.3)	122.0	
35 – 44	124	21.6	8.9 (5.0 – 12.7)	88.4	
45 – 54	60	10.5	4.3 (3.1 – 5.5)	42.8	
> 54	28	4.9	2.0 (0.9 – 3.1)	20.0	
All	574	409.4			< 0.001
Stab wound	**n**	**%**	**Mean/year (95% CI)**	**Rate/100 000 persons**	***p*-Value**
Gender					
Male	414	80.0	29.6 (20.6 – 38.6)	295.3	
Female	104	20.0	7.4 (4.9 – 9.9)	74.2	< 0.001

Table 3 Cont'd: Trauma-related injury presenting to the ED per 100 000 inhabitants in Curacao from 2000 to 2013

Stab wound	**n**	**%**	**Mean/year (95% CI)**	**Rate/100 000 persons**	***p*-Value**
Age					
0 – 14	5	1.0	0.36 (-0.073 – 0.78)	3.6	
15 – 24	126	24.3	9.0 (6.0 – 12.0)	89.9	
25 – 34	170	32.8	12.1 (8.3 – 16.0)	121.2	
35 – 44	124	23.9	8.9 (5.9 – 11.8)	88.4	
45 – 54	70	13.5	5.0 (3.3 – 6.7)	49.9	
> 4	23	4.4	1.6 (0.78 – 2.5)	16.4	
All	518			369.4	< 0.001
Molestation	**n**	**%**	**Mean/year (95% CI)**	**Rate/100 000 persons**	***p*-Value**
Gender					
Male	2488	73.3	177.7 (132.5 – 223.0)	1774.4	
Female	908	26.7	64.9 (45.7 – 84.0)	647.6	< 0.001
Age					
0 – 14	80	2.4	5.7 (3.6 – 7.8)	57.1	
15 – 24	719	21.2	51.4 (36.8 – 66.0)	512.8	
25 – 34	894	26.3	63.9 (44.5 – 83.2)	637.6	
35 – 44	894	26.3	63.9 (43.7 – 84.0)	637.6	
45 – 54	548	16.1	39.1 (31.2 – 47.1)	390.8	
> 54	261	7.7	18.6 (14.3 – 23.0)	186.1	
All	3396			2422.0	< 0.001

traffic-related deaths per 100 000 inhabitants in Curacao, in comparison with those in the Netherlands where there were 3.9/100 000 deaths. Traffic-related total mortality in the countries in the Caribbean region and Curacao are comparable. Traffic-related deaths in the Netherlands are stable over the years, which can be explained by the fact that it is a country with rules, laws and well-organized law enforcement. As a part of the Dutch kingdom, it is pitiful that there are so many traffic-related deaths in Curacao (5, 7, 9, 10).

Over the last few years, more patients who were presented with trauma-related injuries in the ED needed to be hospitalized or died in the ED, despite the decline in the incidence trends of trauma-related injuries. The explanation could be that people are more aggressive in traffic and also during robberies and disagreements. If Curacao is compared with the USA, there are dissimilarities. In the USA, there were far more injuries by molestation, 550 per 100 000 inhabitants (in 1993), than in Curacao with a mean per year of 173 per 100 000. But in Curacao, more people died in the ED by molestation-related trauma than in the USA (10, 11). The firearm-related just like the stab wound-related injuries are equal for both countries. Although, in contrast with large parts of the USA, the possession of a firearm is illegal in Curacao. There is a decline in firearm-related trauma over the last five years, but the hospitalization and mortality numbers are equal. So the recent hospitalization andmortality rate per incidence of firearm-related trauma are higher. The hospitalization rates for molestation-related trauma in the USA is 7.6% lower than in Curacao (18.9%). The in-hospital mortality after firearm-related trauma in the USA is 8.1% and is a little higher than in Curacao (6.1%). It should not be forgotten that trauma is the main cause of death in people less than 35 years of age, and even 10% of all the deaths among men and women in all age groups in the USA (11–14).

These results are just the tip of the iceberg. This is because there are many patients who do not go to the ED and who are not reported. In general, the similarities between different studies can be found as well, young men in all the countries are significantly more involved in trauma-related injuries [$p < 0.05$] (9, 15, 16). Men are generally more reckless. It should be noted that in this study, gender was not compensated for; there are more women than men in Curacao. Otherwise, the difference in gender would even be more explicit. A possible bias is that this is a retrospective study based on a prospective registration of the National Hospital Financial Discharge Register. Unfortunately, this registry is too limited to score international criteria like the Trauma and Injury Severity Score [TRISS] (1, 16, 18). Beside that, it was

also not possible to measure for example 30-day mortality; and only the mortality in the ED was measurable.

CONCLUSION

This present study indicates that the incidence-trends of trauma-related injuries have declined in Curacao between 2000 and 2013. But despite the decline in overall inci-dence, the hospitalizations rate are steady and has even increased in the traffic-related injury group. The highest incidence rates were seen among men, aged between 15 and 34 years for trauma-related injuries. There is a higher incidence of trauma-related injuries, in Curacao compared to those in The Netherlands which are comparable with those in the other countries in the region. It is the wish of the SEHOS as part of The Netherlands, to provide a consecutive registry that is comparable with that of The Netherlands and the region. This registry will be linked to the Dutch 'National Trauma Database'. Besides that, the International Classification of Diseases (ICD) of the WHO will be included in the registry. The current study was a start to gather data of trauma-related injuries and determine the biases to start a functional trauma register with the end-objective being to improve the health-system in Curacao.

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REFERENCES

1. Goslings JC, Gouma DJ. Trauma registration. A promising, but difficult process. Ned Tijdschr Geneeskd 2009; **153:** 744–6.
2. World Health Organization. Small Arms and Global Health. Geneva: Injuries and Violence Prevention Department, WHO; 2001.
3. World Health Organization. About the Global Burden of Disease (GBD) project. Geneva: Global burden disease, WHO; 2010.
4. World Health Organization. WHO Mortality Database. Geneva: Health statistics and health information systems, WHO; 2012.
5. Central Bureau of Statistics Curacao. Population, Population of Curacao. Curacao; 2013-11-12. [Cited 2014 March 26] Available from: http://www.cbs.cw/cbs/themes/Population/Data/Population-2013111273411.pdf.
6. The World Bank. World Development Indicators. Washington; 2011. [Cited 2014 March 20] Available from: http://data.worldbank.org/indicator/NY.GDP.PCAP.CD
7. Central Bureau voor de Statistiek. Bevolking; kerncijfers. Nederland; 21 oktober 2013. [Cited 2014 March 26] Available from: http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=37296ned&D1=a&D2=0, 10, 20, 30, 40, 50, 60, (l-1), l&HD = 130605-0924&HDR=G1&STB=T.
8. Patton GC, Coffey C, Sawyer SM, Viner RM, Haller DM, Bose K, Vos T, Ferguson J, Mathers CD. Global patterns of mortality in young people: a systematic analysis of population health data. Lancet 2009; **374:** 881–92.
9. World Health Organization. Road traffic deaths. Geneva: Global Health Observatory (GHO), WHO; 2010.
10. Central Bureau of Statistics Curacao. Security and Justice, Road accidents. Curacao; 2013-11-11. Curaçao; 2013-11-11. [Cited 2014 March 26] Available from: http://www.cbs.cw/cbs/themes/Security%20and%20Justice/Data/Security%20&%20Justice-2013111113845.pdf
11. Central Bureau of Statistics Curacao. Security and Justice, Registered cases by crime category. Curacao; 2013-11-11. [Cited 2014 March 26] Available from: http://www.cbs.cw/cbs/themes/Security%20and%20Justice/Data/Security%20&%20Justice-2013111112139.pdf
12. Rand MR, Strom K. Violence-related injuries treated in hospital emergency departments. Bur Justice Stat Spec Rep 1997; 1–11.
13. Kalesan B, French C, Fagan JA, Fowler DL, Galea S. Firearm-related Hospitalizations and In-Hospital Mortality in the United States, 2000-2010. Am J Epidemiol 2014; **179:** 303–12.
14. Demnison C, Pokras R. Design and Operation of the National Hospital Discharge Survey: 1988 Redesign. Vital Health Stat 1 2000; **39:** 1–42.
15. Mattila VM, Mäkitie I, Pihlajamäki H. Trends in hospitalization for firearm-related injury in Finland from 1990 to 2003. J Trauma 2006; **61:** 1222–7; discussion 1227.
16. Feliciano DV, Mattox K, Moore EE. Trauma, 6th ed. New York, NY: McGraw-Hill; 2008: 941–971.
17. Schluter PJ, Nathens A, Neal ML, Goble S, Cameron CM, Davey TM et al. Trauma and Injury Severity Score (TRISS) coefficients 2009 revision. J Trauma 2010; **68:** 761–70.
18. Boyd CR, Tolson MA, Copes WS. Evaluating trauma care: the TRISS method. Trauma Score and the Injury Severity Score. J Trauma 1987; **27:** 370–78.