

Cost savings associated with 10 years of road safety policies in Catalonia, Spain

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Objective To determine whether the road safety policies introduced between 2000 and 2010 in Catalonia, Spain, which aimed primarily to reduce deaths from road traffic collisions by 50% by 2010, were associated with economic benefits to society.

Methods A cost analysis was performed from a societal perspective with a 10-year time horizon. It considered the costs of: hospital admissions; ambulance transport; autopsies; specialized health care; police, firefighter and roadside assistance; adapting to disability; and productivity lost due to institutionalization, death or sick leave of the injured or their caregivers; as well as material and administrative costs. Data were obtained from a Catalan hospital registry, the Catalan Traffic Service information system, insurance companies and other sources. All costs were calculated in euros (€) at 2011 values.

Findings A substantial reduction in deaths from road traffic collisions was observed between 2000 and 2010. Between 2001 and 2010, with the implementation of new road safety policies, there were 26 063 fewer road traffic collisions with victims than expected, 2909 fewer deaths (57%) and 25 444 fewer hospitalizations. The estimated total cost savings were around €18 000 million. Of these, around 97% resulted from reductions in lost productivity. Of the remaining cost savings, 63% were associated with specialized health care, 15% with adapting to disability and 8.1% with hospital care.

Conclusion The road safety policies implemented in Catalonia in recent years were associated with a reduction in the number of deaths and injuries from traffic collisions and with substantial economic benefits to society.

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Introduction

Road traffic collisions are a major cause of premature death and disability worldwide: every year, 20 to 50 million people involved in collisions are injured and around 1.3 million die.¹ In particular, road traffic injuries are the main cause of death among adolescents and young adults.² The World Health Organization (WHO) estimates that death from road traffic injuries will become the fifth leading cause of death worldwide in 2030;³ in 2004, it was the ninth.⁴ Although 90% of these deaths are concentrated in low- and middle-income countries, road traffic collisions in WHO's European Region cause at least 120 000 deaths and injure 2.4 million people each year.⁴

Road traffic injuries have not always been considered a preventable health problem,⁵ but it has long been known that they are related to modifiable determinants. Tackling them is not substantially different from tackling other health problems.⁶ Actions to prevent road traffic injuries and reduce associated mortality and disability include modifying the various factors involved in collisions. These factors may play a role before, during or after a collision and may be related to the characteristics of the individuals involved, the vector that made the transfer of mechanical energy possible (e.g. the vehicle) or physical and socioeconomic circumstances.⁶ Several interventions have proved effective in preventing road traffic injuries. Among them are legal measures aimed at restricting driving under the influence of alcohol and at ensuring gradual access to driving licences, as well as improvements in the design of vehicles and the road network.⁷

In the early years of the twenty-first century, the government of Catalonia, an autonomous region in north-eastern Spain, endorsed the European Commission's goal of cutting by half the number of deaths from road traffic collisions between 2000 and 2010 and included this goal in road safety and health policy.^{8–10} The development of new road safety policies was made possible by a social and political consensus on the importance of road safety. Actions were taken to decrease traffic speed, reduce driving under the influence of alcohol, increase the use of safety equipment and improve the road infrastructure. Several interventions were implemented: educational campaigns were run through the mass media, police monitoring was increased and fines were used more extensively. In 2006, legal measures were introduced to fine reoffenders using a penalty point system and to make serious traffic infractions a criminal offence. Studies have shown that the incidence of road traffic injuries can be greatly reduced by speed cameras,¹¹ by including road safety in the political agenda,¹² by using a penalty point system¹³ and by criminalizing traffic offences.^{14,15}

In addition to their social and epidemiological effects, road traffic injuries also have substantial economic implications: they lead to increased direct and indirect costs and to losses in productivity. The annual cost of road traffic collisions has been estimated for different areas of Spain: it was 1586 million euros (€) in the northwestern region of Galicia in 2003, €240 million in the Canary Islands in 1997, €9039 million in the whole of Spain in 2004, €144 million in the whole of Catalonia in 2007 and €367 million in the Catalan capital Barcelona in 2003.^{16–20} The literature reports that the cost of

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Table 1. Deaths, injuries and hospital admissions on account of road traffic collisions, Catalonia, Spain, 2000–2010

Deaths/injuries/admissions	No. per year										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
People killed	891	815	812	751	661	641	569	521	439	411	381
People injured	23 438	22 992	21 465	20 618	20 229	20 965	24 854	26 063	24 590	24 663	24 132
People injured (interurban collisions)	6 320	5 697	4 551	4 182	3 509	3 723	7 959	8 788	8 145	7 972	8 142
Drivers injured	20 608	20 317	18 808	18 031	17 442	18 190	21 901	20 908	21 879	21 835	21 379
Hospital admissions	10 178	9 335	8 793	8 574	7 905	7 772	7 435	7 692	6 708	6 266	6 050
Emergency admissions	9 527	8 778	8 194	7 643	7 053	6 859	6 505	6 606	5 629	5 106	4 948
Emergency admissions for severe injuries ^a	5 035	4 549	4 111	3 673	3 465	3 363	3 062	3 103	2 764	2 387	2 282

^a Severe injuries included spinal cord, brain and lower extremity injuries.

road traffic collisions lies between 0.5% and 2.3% of a country's gross domestic product.^{21–24}

The objective of this study was to determine whether the road safety policies introduced in Catalonia between 2000 and 2010 were associated with economic benefits to society.

Methods

We conducted a cost analysis using a societal perspective to estimate the cost savings associated with the introduction of road safety policies in Catalonia. Estimates were made and reported in accordance with commonly accepted methodological guidelines.²⁵ The analysis considered: (i) direct health-care costs, including the cost of hospital care, ambulance services, autopsy and specialized health care; (ii) direct non-health-care costs, including the cost of adapting to disability, material costs, administrative costs and the cost of police, firefighter and roadside assistance; and (iii) indirect costs associated with the lost productivity of individuals who died and individuals who were injured and their carers. In general, the time horizon of the study was 10 years. However, in calculating the cost of lost productivity due to death or to sick leave taken by an injured individual and his or her carer, the time horizon was extended to include the rest of the working life of the individual or carer, where appropriate. All costs are presented in euros, at 2011 values. Costs were adjusted to 2011 values using the consumer price index when necessary.²⁶

Number of victims and collisions

The number of deaths due to road traffic injuries that were avoided between 2001 and 2010 was calculated from the difference between the number of people killed in road traffic collisions in 2000 and the number killed in each other year.¹⁵ The number of collisions with victims, the number of interurban collisions with victims and the number of driver victims that were avoided between 2001 and 2010 were calculated in the same way.¹⁵

Some people injured in road traffic collisions require hospitalization. We calculated the number of acute hospital admissions due to traffic injuries using the code for external causes of injury and the type of payment for treatment recorded in a registry of acute care

hospitals in Catalonia, known by its Catalan acronym, CMBDHA. We included admissions classified using codes E810–E819, E826–E829 and 800–999 of the *International classification of diseases, ninth revision, clinical modification* (ICD-9-CM). For some cost estimates, where it was important to avoid overcounting of individuals who were readmitted to hospital, we counted the number of emergency admissions. In counting the number of individuals with severe injuries, we included only those with injuries to the spinal cord, head or lower extremities, which are the main relevant diagnoses in the Barell injury diagnosis matrix.²⁷

Table 1 gives details of the number of deaths, injuries and hospital admissions associated with road traffic collisions in the years 2000 to 2010. Table 2 summarizes how the cost savings associated with the introduction of road safety policies were calculated.

Direct health-care costs

We calculated the cost savings in hospital care from the difference between the number of hospital admissions associated with road traffic collisions in 2000 and the number of corresponding admissions in the years 2001 to 2010. The appropriate diagnosis-related group cost, updated to the 2011 value, was applied, according to classification on admission.^{26,35}

The cost savings in ambulance services were estimated by assuming that all emergency admissions to hospital required transportation by ambulance. We applied the cost of emergency ambulance transport to the sum of the difference between the number of emergency admissions associated with road traffic collisions in 2000 and the corresponding number in the years 2001 to 2010.¹⁸

The cost savings in autopsy services were estimated by assuming that each death required an autopsy. We applied the average cost of an autopsy to the sum of the difference between the number of people killed in road traffic collisions in 2000 and the number killed in the years 2001 to 2010.¹⁵

The cost savings in specialized health care were estimated by assuming that patients with an injury to the spinal cord, head or lower extremities required 4 hours per day of specialized care. We applied the cost of 4 hours of specialized care per day for 365 days, updated to 2011 values, to the sum of the difference

Table 2. **Data used in calculating the cost savings associated with the implementation of road safety policies, Catalonia, Spain, 2001–2010**

Cost category	Events avoided during 2001–2010	Price per unit ^a	Data sources
Direct health-care costs			
Hospital care	25 444 admissions	Diagnosis-related group cost	CMBDHA, Ministerio de Sanidad, Política Social e Igualdad
Ambulance services	27 949 emergency admissions	€670 per emergency ambulance transport	CMBDHA, Lladó and Roig ¹⁸
Autopsy services	2909 deaths	€260 per autopsy	Servei Català de Trànsit, ¹⁵ personal communication
Specialized health-care	17 591 emergency admissions due to severe injuries ^b	€20 203 per year for 4 hours of specialized care per day	CMBDHA, Observatori Social de Barcelona ²⁸
Direct non-health-care costs			
Adapting to disability	12 965 emergency admissions due to severe injuries ^c	€6546 per individual	CMBDHA, Observatori Social de Barcelona ²⁸
Material costs	26 063 collisions with victims	€1200 per collision	Servei Català de Trànsit 2008 UNESPA ²⁹
Administrative costs	26 063 collisions with victims	€755 per collision	Servei Català de Trànsit 2008, Asociación ICEA, ³⁰ Instituto de Estudios de Automoción ³¹
Police assistance	26 063 collisions with victims	€911 per collision	Servei Català de Trànsit, ¹⁵ Lladó and Roig ¹⁸
Firefighter assistance	2354 interurban collisions with victims	€150 per collision	Servei Català de Trànsit, ¹⁵ Lladó and Roig ¹⁸
Roadside assistance	6161 collisions with a driver victim	€187 per collision	Servei Català de Trànsit, ¹⁵ Lladó and Roig ¹⁸
Indirect costs			
Productivity lost due to institutionalization	1 141 727 days in hospital	Mean labour cost of €32 952 per year	CMBDHA, INE
Productivity lost due to permanent sick leave	69 321 working years lost due to severe injuries ^d	Mean labour cost of €32 952 per year	CMBDHA, INE, Institut Guttmann Hospital de Neurorehabilitació ³²
Productivity lost by carers	12 965 emergency admissions due to severe injuries ^c	Mean labour cost of providing 5 hours of care per day was €21 960 per year	CMBDHA, INE
Productivity lost by carers who took permanent sick leave	69 321 working years lost due to severe injuries ^d	Mean labour cost of €32 952 per year	CMBDHA, Barceló, ³³ INE, Institut Guttmann Hospital de Neurorehabilitació ³²
Productivity lost due to death	2909 deaths	€1 400 000 per statistical life	Servei Català de Trànsit, ¹⁵ Abellán ³⁴

€, euro; INE, *Instituto Nacional de Estadística* (National Statistics Institute).

CMBDHA is the Catalan acronym for the registry of acute care hospitals in Catalonia.

^a All prices were adjusted to 2011 values.

^b Severe injuries included spinal cord, brain and lower extremity injuries.

^c This figure includes all emergency admissions involving injuries to the spinal cord or head and 20% involving injuries to the lower extremities.

^d This figure includes all years lost due to injuries to the spinal cord or head and 20% of years lost due to injuries to the lower extremities.

between the number of emergency admissions involving injuries to the spinal cord, head or lower extremities in 2000 and the corresponding number in the years 2001 to 2010.^{26,28,36}

Direct non-health-care costs

The cost savings in adapting to a disability acquired in a road traffic collision took into account the annualized investment required to adapt the home of an individual who was physically disabled and the cost of technical and mobility aids,²⁸ updated to 2011 values.²⁶ We applied this cost to the sum of the difference between the number of all emergency admissions involving

injuries to the spinal cord or head plus 20% of emergency admissions involving injuries to the lower extremities in 2000 and the number of similar admissions in the years 2001 to 2010.²⁴ It was assumed conservatively that only 20% of patients admitted with injuries to the lower extremities would suffer long-term disability.²⁴

The savings in material costs, such as in the cost of damage to vehicles, were estimated by calculating the difference between the number of collisions with victims in 2000 and the number in each year from 2001 to 2010 and then applying an average cost of €1200 per collision to the sum of these differences.²⁹

We assumed that there is an administrative cost when compensation has to be paid. According to data from insurance companies, administration costs make up 10.12% of car insurance premiums.³⁰ Correspondingly, we assumed that the administrative cost of arranging compensation was 10.12% of the value of the compensation. We then calculated the difference between the number of collisions with victims in 2000 and the corresponding number in the years 2001 to 2010^{15,31} and applied a cost of 10.12% of the mean compensation of €5805 for serious bodily injury, updated to 2011 values, to the sum of these figures.²⁶

The cost savings in police assistance were estimated by applying the cost of a single instance of police assistance, updated to 2011 values, to the sum of the difference between the number of collisions with victims in 2000 and the number in the years 2001 to 2010.^{15,18,26}

In calculating the cost savings in firefighter assistance, we assumed that firefighters had to attend all interurban collisions with victims. We applied the cost of a single instance of assistance by firefighters, updated to 2011 values, to the sum of the difference between the number of interurban collisions with victims in 2000 and the number of similar collisions in the years 2001 to 2010.^{15,18,26}

Finally, we assumed that roadside assistance was required for all collisions with a driver victim. We applied the cost of roadside assistance, updated to 2011 values, to the sum of the difference between the number of collisions resulting in the injury or death of the driver in 2000 and the number of similar collisions in the years 2001 to 2010.^{15,18,26}

Cost of lost productivity

In estimating the cost of the productivity lost due to institutionalization for each ICD-9-CM diagnosis code, we selected the higher of (i) the number of days that individuals classified using that code stayed in hospital and (ii) the number of sick days taken by individuals classified using that code, as indicated by data from Spain's National Institute of Social Security.³⁷ We then applied the average labour cost in Catalonia in 2010,³⁸ updated to 2011 values,²⁶ to the sum of the difference between the number of days lost in 2000 and the number lost in the years 2001 to 2010, corrected for the unemployment rate in the Catalan population.³⁹

The cost of productivity lost due to permanent sick leave associated with spinal cord, brain or lower extremity injury in each year was calculated from the total number of working years lost (i.e. retirement age minus mean age at injury) due to injuries occurring in that year. We took into account all working years lost due to spinal cord and brain injuries but only 20% of the years lost as a result of lower extremity injuries.²⁴ We subsequently applied the average labour cost in Catalonia in 2010,³⁹ updated to 2011 values,²⁶ to the sum of the difference between the number of working years lost in 2000 and the number lost in the years 2001 to 2010, corrected for

Table 3. Cost savings associated with the implementation of road safety policies, Catalonia, Spain, 2001–2010

Cost category	Cost savings (€)
Direct health-care costs	
Hospital care	49 293 607
Ambulance services	18 735 047
Autopsy services	755 341
Specialized health-care	382 268 620
Direct non-health-care costs	
Adapting to disability	91 281 753
Material costs	4 570 800
Administrative costs	2 474 180
Police assistance	3 470 363
Firefighter assistance	79 761
Roadside assistance	1 007 026
Subtotal: direct costs saved	605 868 390
Indirect costs	
Productivity lost due to institutionalization	103 073 862
Productivity lost due to permanent sick leave	9 365 985 480
Productivity lost by carers	386 298 362
Productivity lost by carers who took permanent sick leave	3 433 570 277
Productivity lost due to death	4 072 600 000
Subtotal: indirect costs saved	17 361 527 979
Total costs saved	17 967 396 369

the unemployment rate in the Catalan population³⁹ and for the rate of labour market participation of each of these injury groups.³³

In calculating the cost of the productivity lost in providing care to individuals with severe injuries, we assumed that each individual required 5 hours of care per day.³⁶ We took into account all individuals with a spinal cord or brain injury but only 20% of those with lower extremity injuries. We then applied the average cost of 5 hours of labour per day for 365 days in Catalonia in 2010,³⁸ updated to 2011 values,²⁶ to the sum of the difference between the adjusted number of specified injuries in 2000 and the number in the years 2001 to 2010.

Further, we assumed that 60% of carers took permanent sick leave to care for individuals with severe injuries.³³ In calculating the number of carers in each year, we took into account all individuals with a spinal cord or brain injury but only 20% of those with lower extremity injuries. We then calculated the cost of the productivity lost by carers who took permanent sick leave in the same way in which we estimated the cost for individuals with severe injuries.^{32,39}

In calculating the cost of the productivity lost due to death, we applied the value of a statistical life to the sum

of the difference between the number of deaths from road traffic collisions in 2000 and the number in the years 2001 to 2010.^{15,34}

Results

During the 10 years from 2001 to 2010, there were 26 063 fewer road traffic collisions with victims than expected, 2909 fewer deaths (i.e. a 57% reduction), 25 444 fewer hospitalizations, 1 141 727 fewer days of temporary sick leave and 69 321 fewer working years of permanent sick leave. The estimated cost savings for all cost categories are shown in Table 3. The total cost savings were €17 967 396 369: 97% of this figure comprised indirect costs, including the cost of productivity lost due to institutionalization, sick leave for the injured and their carers and death. Overall, 63% of the direct cost savings comprised specialized health-care costs, 15% comprised the cost of adapting to disability and 8.1%, hospital care costs.

Discussion

Our economic analysis showed that, from a societal perspective, the cost savings observed in association with the implementation of road safety policies

in Catalonia between 2000 and 2010 totalled €17 967 396 369. In addition, the results of the analysis highlight the importance of the indirect costs of lost productivity due to institutionalization, sick leave for the injured and their carers and death. These indirect costs far exceeded the direct costs of road traffic collisions. In fact, literature reports confirm that injuries, even minor injuries, have substantial cost implications because they occur frequently and are associated with long-term morbidity.

It is difficult to determine precisely what fraction of costs in a cost category (e.g. administrative costs) is attributable to a particular factor (e.g. injury from road traffic collisions in a given year). In this study, we estimated costs using the epidemiological and cost information available for each cost category, rather than by working with attributable fractions of costs. Consequently, the estimates obtained were numerically accurate but may have been conservative.

Since the cost analysis adopted a societal perspective, government subsidies, such as those for permanent sick leave, were not included insofar as they are money transfers made by the government to individuals who meet certain requirements. They do not reduce a country's wealth and, hence, do not represent an extra cost.²⁵ Similarly, the cost of compensation was not included because compensation involves the transfer of money from insured individuals to injured individuals. In contrast, in estimating the cost of lost productivity, the cost of labour was taken to be the average gross monthly salary of a worker plus the employer's contributions to social security. In this case, inclusion of these contributions was justified because their value reflects the social value of the worker's productivity, as revealed by the company's willingness to pay, and not just the private value.²⁵

As is true for any cost analysis, our estimates are subject to various limitations, most of which are associated either with a lack of information about the consumption of resources or with specific aspects of the information systems used. For example, during the 10 years studied, the coverage and quality of data (e.g. diagnostic code and external cause classifications) in the registry of acute care hospitals in Catalonia have improved. In addition, the Catalan Traffic Service's information system has also increased its coverage, especially since 2007. Thus,

health-care cost savings may have been underestimated. Similarly, our analysis included only individuals whose principal diagnosis was injury and did not include those whose principal diagnosis was classified using another diagnostic code, even though they may also have had an injury. This would also lead to an underestimate of the number of individuals injured in collisions and, therefore, of savings in health-care costs. In the registry of acute care hospitals in Catalonia, it is not always possible to identify individuals who have been admitted more than once. To minimize the possibility of double counting individuals without introducing other biases, we counted the number of emergency admissions. This approach is commonly used in research on the epidemiological characteristics of rear-end collisions.⁴⁰

We did not include details of injuries treated at primary care facilities or emergency departments because of a lack of information. Although injuries treated at these locations may be less serious, they are often associated with temporary sick leave and substantial costs. This is particularly true of whiplash injuries.⁴¹ In addition, using mean values to estimate the cost of specialized health-care, of adapting to disability and of productivity lost by carers may lead to inaccurate results. However, since these mean values were applied only to individuals diagnosed with a spinal cord, brain or lower extremity injury, the effect of any bias introduced was small. In calculating the cost of specialized health-care and of adapting to disability, we considered only emergency hospitalizations associated with a principal diagnosis of spinal cord, brain or lower extremity injury. This led to a conservative estimate of cost because we did not take into account hospitalizations associated with a principal diagnosis of injury to other body areas or with multiple diagnoses, either of which could have led to long-term disability.

Although we aimed to include costs for all actors in society,²⁵ the lack of attribution factors made it impossible to include the proportion of the cost of research, collision prevention policies and congestion associated with road traffic collisions.^{22,42} Conversely, the savings associated with the reduction in air pollution observed after the implementation of road safety policies were also excluded.⁴³ Moreover, the decision of what costs to include in certain cost categories is

controversial. For example, other studies have included administration costs in their entirety, whereas we included only an estimate of the additional administrative cost of arranging compensation. Finally, we did not include intangible costs, such as those arising from anxiety or pain, because of methodological difficulties in their estimation.

One of the European Commission's objectives for this decade is to reduce road traffic collisions, and the General Assembly of the United Nations officially declared the decade from 2011 to 2020 the decade of action for road safety. In addition, the European Commission's Road Safety Action Programme specifies the actions to be taken to improve road user behaviour, vehicle safety and road infrastructure.⁴⁴ In fact, economic assessments have proved the efficacy of many of the recommended measures, particularly the use of speed control radar, airbags, helmets and headlights during the day.^{45–48}

This study demonstrates that implementing evidence-based road safety policies brings benefits: Catalonia has experienced the largest change in the health of its population since the beginning of the century, in large part as a result of such policies. The implementation of these policies was made possible by explicit and continuing political commitment supported by society in general, which is very sensitive to the testimony of traffic injury victims, and by the mass media. However, several errors occurred during implementation. For example, speed limits were introduced on the main access routes into the centre of Barcelona before a political and social consensus had been achieved and the limits had to be removed, despite being supported by scientific societies.⁴⁹ In addition, some counterproductive policies were implemented, probably for economic motives or because an insufficiently broad view of urban mobility had been adopted. For example, the decision to allow all people licensed to drive a car to drive motorcycles with an engine capacity up to 125 cc resulted in an increase in injuries among motorcyclists.⁵⁰

Having reduced the number of injuries and deaths due to road traffic collisions between 2000 and 2010, Catalonia now faces the challenge of achieving the objectives of the United Nations' decade of action for road safety in the context of an economic crisis. Success will depend on Catalonia's continuing ability to

demonstrate that rather than restricting economic development or individual freedom, injury prevention policies produce benefits for the economy, society and the health-care system. ■

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ملخص

وفورات التكاليف المرتبطة بعشر سنوات من سياسات السلامة على الطرق في كاتالونيا أسبانيا

النتائج لوحظ حدوث انخفاض كبير في الوفيات الناجمة عن التصادمات المرورية على الطرق في الفترة بين عامي 2000 و2010. وبين عامي 2001 و2010 ومع تنفيذ السياسات الجديدة المعنية بالسلامة على الطرق، كان هناك 26063 حادثا تصادم مروري بعدد ضحايا أقل من المتوقع و2909 حالة وفاة أقل (57٪) و25444 حالة إدخال إلى المستشفى أقل. وكان إجمالي وفورات التكاليف وفق التقديرات حوالي 18000 مليون يورو. وكان حوالي 97٪ من هذه الوفورات ناتجا عن انخفاضات في الإنتاجية المفقودة. وكانت 63٪ من وفورات التكاليف المتبقية مرتبطة بالرعاية الصحية المتخصصة و15٪ بالتكيف مع العجز و8.1٪ بالرعاية التي تقدمها المستشفيات. الاستنتاج ارتبطت سياسات السلامة على الطرق التي تم تنفيذها في كاتالونيا في السنوات الأخيرة بالانخفاض في عدد الوفيات والإصابات الناجمة عن التصادمات المرورية وبفوائد اقتصادية كبرى على المجتمع.

الغرض تحديد ما إذا كانت سياسات السلامة على الطرق التي تم سنها في الفترة من 2000 إلى 2010 في كاتالونيا، بإسبانيا، والتي استهدفت بشكل رئيسي خفض الوفيات الناجمة عن التصادمات المرورية على الطرق بنسبة 50٪ بحلول عام 2010، مرتبطة بفوائد اقتصادية للمجتمع. الطريقة تم إجراء تحليل للتكلفة من منظور مجتمعي بأفق زمني قدره 10 سنوات. ووضع في الاعتبار تكاليف ما يلي: دخول المستشفيات؛ والنقل بسيارات الإسعاف؛ والتشريح؛ والرعاية الصحية المتخصصة؛ والشرطة ورجال الإطفاء والمساعدة على الطرق؛ والتكيف مع العجز؛ والإنتاجية المفقودة بسبب إضفاء الطابع المؤسسي والوفاة أو الإجازة المرضية للمصابين أو مقدمي الرعاية لهم؛ بالإضافة إلى التكاليف المادية والإدارية. وتم الحصول على البيانات من سجل إحدى المستشفيات الكتالونية ونظام معلومات الخدمات المرورية الكتالونية وشركات التأمين وغيرها من المصادر. وتم حساب جميع التكاليف باليورو بقييم عام 2011.

摘要

加泰罗尼亚10年道路安全政策相关的成本节约西班牙

目的 确定2000年和2010年之间在西班牙加泰罗尼亚引入的道路安全政策是否与社会经济效益相关，该政策主要旨在到2010年将道路交通碰撞死亡率减少50%。

方法 从社会角度进行10年时间期的成本分析。其中考虑的成本包括：住院；救护车出车；尸检、专业卫生保健；警察、消防队员和路边援助；残疾适应和由于制度化、死亡或受伤者的病假及其照顾者而损失的生产力；以及物质和管理成本。数据来源于加泰罗尼亚医院登记、加泰罗尼亚交通服务信息系统、保险公司和其他来源。所有费用按2011年的欧元(€)值计算。

结果 据观察，2000年和2010年之间的交通事故死亡率显著减少。在2001年和2010年之间，随着新的道路安全政策的实施，道路交通碰撞受害者比预期减少26063例，死亡数减少2909例(57%)，住院人数减少25444例。估计总成本节省大约为180亿欧元。其中，约97%是因为减少了生产力损失。其余的成本节约中，63%与专业卫生保健相关，15%与残疾适应相关，8.1%与医院护理相关。结论 近年来在加泰罗尼亚实施的道路安全政策与交通事故死亡和受伤人数的减少有关，并带来了可观的社会经济效益。

Résumé

Économies associées à 10 ans de politiques de sécurité routière en Catalogne, Espagne

Objectif Déterminer si les politiques de sécurité routière introduites entre 2000 et 2010 en Catalogne, Espagne, qui visaient principalement à réduire de 50% les décès causés par des collisions routières avant 2010, ont été associées à des avantages économiques pour la société.

Méthodes Une analyse des coûts a été réalisée dans une perspective sociétale sur un horizon temporel de 10 ans. Elle a pris en compte les coûts suivants: les admissions à l'hôpital, les transports en ambulance, les autopsies, les soins de santé spécialisés, la police, les pompiers et les dépannages routiers, l'adaptation au handicap et la productivité perdue en raison du placement des personnes dans des établissements spécialisés, les décès ou les congés des blessés ou de leurs aidants, ainsi que les coûts matériels et les frais administratifs. Les données provenaient du registre d'un hôpital catalan, du système d'information du Service catalan de la circulation, des compagnies d'assurance et d'autres sources. Tous les coûts ont été calculés en euros (€), selon les

valeurs de l'année 2011.

Résultats Une diminution substantielle des décès causés par collision routière a été observée entre 2000 et 2010. Entre 2001 et 2010, grâce à la mise en œuvre de nouvelles politiques de sécurité routière, on a recensé une diminution de 26 063 collisions routières avec victimes, une diminution de 2909 décès (57%) et une diminution de 25 444 hospitalisations. Le total des économies estimé sur les coûts était d'environ 18 000 millions d'euros. En ce qui concerne ce chiffre, environ 97% résultaient de la réduction des coûts liés à la perte de productivité. Parmi les économies restantes, 63% étaient associées aux soins de santé spécialisés, 15% à l'adaptation au handicap et 8,1% aux soins hospitaliers. **Conclusion** Les politiques de sécurité routière mises en place en Catalogne ces dernières années ont été associées à une réduction du nombre de décès et de blessures causés par des collisions routières et à des avantages économiques substantiels pour la société.

Резюме

Экономия затрат, связанная с политикой безопасности дорожного движения, реализуемой в Каталонии в течение 10 лет Испании

Цель Определить, являлась ли политика безопасности дорожного движения, реализуемая с 2000 по 2010 годы в Каталонии, Испания, направленная, в первую очередь, на снижение смертности от дорожно-транспортных происшествий на 50% к 2010 г., экономически выгодной для общества.

Методы С данной целью был проведен анализ затрат в течение 10-летнего периода с социальной точки зрения. Учитывались следующие затраты: госпитализация, скорая помощь, проведение вскрытий, специализированная медицинская помощь; полиция, пожарные и помощь на дорогах; адаптация к инвалидности; потери производительности по причине госпитализации, смерти или временной нетрудоспособности потерпевших или их опекунов; а также материальные и административные расходы. Данные были получены из записей региональной больницы Каталонии, информационной системы службы дорожного движения Каталонии, от страховых компаний и из других источников. Все затраты были рассчитаны в евро в ценах 2011 г.

Результаты В период между 2000 и 2010 годами наблюдалось

существенное снижение смертности в результате дорожно-транспортных происшествий. Благодаря внедрению новой политики безопасности дорожного движения с 2001 по 2010 годы было зарегистрировано на 26 063 меньше случаев ДТП с пострадавшими, чем ожидалось, на 2 909 меньше смертельных исходов (57%) и на 25 444 меньше случаев госпитализации. Расчетная общая экономия затрат составила около 18 млрд. евро. Из этой суммы около 97% пришлось на потери производительности. Из оставшихся сумм экономии затрат 63% было связано со специализированной медико-санитарной помощью, 15% – с адаптацией к инвалидности и 8,1% – с уходом при госпитализации.

Вывод Политика безопасности дорожного движения, применяемая в Каталонии в последние годы, привела не только к сокращению числа смертей и травм в результате дорожно-транспортных происшествий, но и к существенной экономической выгоде для общества.

Resumen

Ahorro asociado a 10 años de políticas de seguridad vial en Cataluña, España

Objetivo Determinar si las políticas de seguridad vial introducidas entre los años 2000 y 2010 en Cataluña, España, cuyo propósito principal era la reducción de los fallecimientos causados por accidentes de tráfico en un 50% hasta el 2010, estuvieron asociadas a un beneficio económico para la sociedad.

Métodos Se llevó a cabo un análisis de costes desde una perspectiva social y un horizonte temporal de 10 años. Se tomaron en consideración los costes de las hospitalizaciones, el transporte en ambulancia, las autopsias, la atención sanitaria especializada, la policía, bomberos y asistencia en carretera, la adaptación a la discapacidad y la pérdida de productividad debido a la institucionalización, las bajas por enfermedad o fallecimiento de los heridos o sus cuidadores, así como los costes materiales y administrativos. Los datos se obtuvieron del registro de un hospital catalán, el sistema de información del servicio catalán de tráfico, compañías aseguradoras y otras fuentes.

Todos los costes se calcularon en euros (€) según los valores del 2011.

Resultados Entre los años 2000 y 2010 se observó una reducción importante de los fallecimientos causados por accidentes de tráfico. Entre el 2001 y el 2010, con la puesta en práctica de las nuevas políticas de seguridad vial, se produjeron 26 063 colisiones con víctimas menos de las esperadas, 2909 fallecimientos menos (57%), así como 25 444 hospitalizaciones menos. El ahorro total estimado fue de aproximadamente 18 000 millones de euros. De éstos, un 97% se derivó de la reducción de la pérdida de productividad, y del ahorro restante, el 63% estuvo asociado con la atención sanitaria especializada, el 15% con la adaptación a la discapacidad y el 8,1% con la atención hospitalaria.

Conclusión Las políticas de seguridad vial puestas en marcha en Cataluña en los últimos años estuvieron asociadas a una reducción en el número de fallecidos y heridos por accidentes de tráfico, así como con beneficios económicos importantes para la sociedad.

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