

# Physical and economic repercussions of traffic accidents : Experience of the Blida University Hospital

## Répercussions physiques et économiques des accidents de la circulation : expérience du CHU de Blida

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### SUMMARY

During the last twenty years, Algeria has experienced an increase in the car fleet, the road network and transport offers as well as a significant drop in the number of road accidents, but during the first quarter of 2020 there has been an increase 9.10% of the number of road accident-related deaths compared to the same period in 2019. The impact of these accidents is considerable both for the victims themselves, their families and for the country in general with an economic deficit which was estimated at 1.4% of the gross national product in 2017. In this work, we studied the physical and economic repercussions of the care of 14 road accident victims in the service of physical medicine and rehabilitation of the Blida University Hospital during the year 2017. We also used national studies concerning this subject in order to highlight the characteristics of these accidents and their main etiologies. With more than 10 deaths and 100 injuries per day and in view of the severity of the after-effects: paraplegia and quadriplegia, we believe it is important to insist on preventive measures, among which: improving availability, reliability and the quality of public transport, ensure compliance with traffic laws, the possible establishment of the points license and the tachograph, the improvement of training with a professional certificate for professional users, as well as education and awareness in schools. We also insist on secondary prevention through care and follow-up by well-equipped local structures and home care for the most dependent patients in order to promote a decent life, prevent additional costs and consider rehabilitation and reintegration into the workplace, the family and the society in general.

**KEY WORDS:** Road accident, paraplegia, tetraplegia, country's gross national product

### RÉSUMÉ

Durant ces vingt dernières années, l'Algérie a connu une augmentation du parc automobile, du réseau routier et des offres de transport ainsi qu'une baisse sensible du nombre d'accidents de la route, or durant le premier trimestre 2020 on constate une augmentation de 9,10 % du nombre de décès liés aux accidents de la route par rapport à la même période en 2019. L'impact de ces accidents est considérable tant pour les victimes elles-mêmes, leur famille que pour le pays en général avec un déficit économique qui a été estimé à 1,4% du produit intérieur brut en 2017. Dans ce travail, nous avons étudié les répercussions physiques et économiques de la prise en charge de 14 accidentés de la circulation au service de médecine physique et réadaptation du CHU de Blida durant l'année 2017. Nous avons également repris des études nationales concernant ce sujet afin de faire ressortir les caractéristiques de ces accidents et leurs principales étiologies.

Avec plus de 10 décès et de 100 blessés par jour et au vu de la gravité des séquelles : paraplégie et tétraplégie, il nous paraît important d'insister sur les mesures de prévention, parmi lesquelles : l'amélioration de la disponibilité, de la fiabilité et de la qualité des transports en commun, la veille au respect du code de la route, l'établissement éventuel du permis à points, du chronotachygraphe, l'amélioration de la formation avec un brevet professionnel pour les usagers professionnels, ainsi que l'éducation et la sensibilisation en milieu scolaire. Nous insistons également sur la prévention secondaire grâce à une prise en charge et un suivi par des structures de proximité bien équipées, voir des soins à domicile pour les patients les plus dépendants afin de promouvoir une vie décente, de prévenir les surcoûts et d'envisager une réadaptation et une réinsertion dans le milieu professionnel et une réintégration familiale et sociale.

**MOTS CLÉS :** accidents de la route, paraplégie, tétraplégie, produit national brut.

### I. INTRODUCTION

During these last twenty years and with an increase of 147% in the number of passenger vehicles, 121% of the Algerian car fleet in general, 380% of the road network and its improvement as well as the increase in transport offers for people and of goods, the road knows an unprecedented affluence with an increased risk of accidents for its permanent or occasional users<sup>[1]</sup>. Before the advent of the covid-19 pandemic, road accidents (RA) were the leading cause of death among young people aged 15 to 29 around the world (WHO, 07/12/2018). They were responsible for more than 1.35 million deaths a year and tens of millions of injured people who were incapacitated and who were socially, academically or professionally disadvantaged because of their injuries<sup>[2]</sup>.

#### STATUS OF THE SITUATION IN ALGERIA

Measures to combat RA resulted in a noticeable drop in the number of accidents in Algeria, from 39233 to 32873, 25038 and 22507 respectively in the years 2005, 2010, 2017 and 2019. This is the same observation for the number of deaths going from an annual total of 3711 to 3660, 3639 then 3275 deaths in the same years, 80% of which are in rural areas. Concerning the wounded, their number increased from 58082, 52435, 36287 and then to 31010 injured with an average exceeding 10 dead and 100 injured per day<sup>[1,3,4]</sup>.

According to a study by the Ministry of Public Works and Transport (A. Hamani, 2017), the economic impact of RA represented **1.4% of the country's gross national product**<sup>[4]</sup>.

However, the road is still as deadly, it is the report established by the national direction of road safety during the first three months of the current year which reports 743 dead and 6923 injured in 5143 RA, that is to say a **9.10% increase** in the number of deaths compared to the first quarter of 2019<sup>[5]</sup>.

With the global and national priority required by the corona virus pandemic and the monitoring of deconfinement measures, the continuity of the fight against RA is essential in order to prevent the road's "hecatomb" and its lot of people with severe lifelong disabilities, as illustrated in the study that we present to you below.

### II. MATERIAL AND METHODS

We collected the files of 14 patients hospitalized in the physical and rehabilitation medicine (PRM) service of the Blida University Hospital during the year 2017 following a traffic accident that subsequently benefited from outpatient follow-up. The costs expressed are presented for information only, they combine hospital expenses and patients' own expenses.

We also carried out a review of the literature through various recent national studies dealing with the same theme.

### III. RESULTS

#### 1. CHARACTERISTICS OF ACCIDENTS AND CASUALTIES

The victims of traffic accidents were men in 78.5% of cases, single, Half were under 29 years old and 85.7% were less than 35 years old, the average age was 30.5 years. In 71% of the cases, they came from Blida and neighbouring cities, the rest were on the east-west highway (Mostaganem) or on the RN 1 (Djelfa, Hassi Messaoud). 71% of patients were not covered by social security and were the drivers of the accident vehicle.

According to a study by Mr A. Hamani (2017), the RA involved light vehicles in 73.95% of the cases; the human factor was incriminated in 95.47% of the cases, with as main etiologies: speeding: 25.05%, overtaking and dangerous manoeuvres: 12.44%, inattention: 10.16% and non-compliance with the safety distance: 4.42%. The condition of the vehicle, the road and the environment share the rest of the etiologies (less than 5%). The causes linked to the vehicle are dominated by: the poor condition of the tires: 1.26%, mechanical failures: 0.60% and faulty braking: 0.54%. The impracticable state

of the road represented only 0.58% of all the etiologies, the outings of animals: 0.43% and the difficult climatic conditions with rain and fog: 0.27%<sup>[4]</sup>. A. Madani and al. note that during the same year (2017), 10% of drivers responsible for AR were without a license and almost a quarter without a profession. The circuits most providing accidents are, in descending order: the east-west highway: 28% of accidents, the national road NR1 (trans-Saharan): 22%, the NR3 (Skikda-Illizi): 13%, the NR4 (Blida-Oran): 9.6%, NR5 (Algiers-Constantine): 9.4%, NR6 (Saoura road): 9%, NR11 (Algiers-Oran passing through the city of Cherchell): 7% and finally NR2 (Tlemcen-Oran): 2%. The number of accidents and deaths peaks on Thursday, between 6 p.m. and 12 p.m., as well as during the summer phase (August)<sup>[1]</sup>.

## 2. HOSPITAL CARE

All patients received codified emergency care including blood tests and a variety of preoperative x-rays. 21.5% were in a serious condition (polytrauma, coma) requiring prior resuscitation, others were hospitalized in internal medicine for vascular complications. 86% benefited from an osteosynthesis of the spine preceded in 75% of the cases of orthopaedic treatment (trans-cervical traction, plastered shell, corset). After a stay in orthopaedic of around 11 days, patients join the PRM service for an average hospital stay of 3 months and 1 week.

## 3. SUPPORT IN PRM

93% of the patients were traumatized of the spine including 2/3 paraplegics and 1/3 of quadriplegics classified Franckel A in 71% of the cases, the rest were brain injuries. The inventory of lesions found during the initial clinical examination is summarized in table 1.

## COSTS OF CARE

### Management of skin complications:

Bedsore are skin and subcutaneous lesions, related to the compression and ischemia of the injured surfaces (prolonged immobilization in the same position) the skin is then "crushed" between two hard surfaces: the bed surface and the bone surfaces underlying. Their usual seat is: sacred, opposite the occiput, the heel, the malleoli, trochanters and ischia (see diagram1).

64% of patients presented with bedsore, 1/3 of which were sacred.

In addition to the mobilization of paramedical staff and the carer with mobilizations and turnovers every 3 hours, body care, bedding and nursing care, the sacred bedsore cost around 71380 dz per bedsore due to the septic region (daily care), the other locations cost 51760 dz per bedsore, adding the price of the most basic anti-bedsore mattress and at the rate of 2 to 3 bedsore per patient, the treatment of this complication cost 151035.5 dz per patient and per hospitalization (see table2). It should be noted that the use of hydrocolloid thinking was not an obligation, classic thinking is also used, the choice of techniques depends on the habits of the paramedical teams and the results obtained as they go.

### Management of bladder and sphincter disorders:

85% of traffic accident victims presented bladder and sphincter disorders with urinary and anorectal incontinence, the own urinary catheterization cost on average 110636,25 dz + 38000 dz for the linings. Symptomatic urinary tract infection cost 12000 dz to 17800 dz per course of antibiotics, knowing that several courses of treatment are sometimes necessary during hospitalization.

### Management of Thromboembolic complications:

Cost 51750 dz / patient and / hospitalization (see Table 3).

### Functional results:

1 patient died after 48 hours following serious lesions of the cervical spine, 57% of paraplegic patients acquired autonomy in a wheelchair, 21% of patients acquired walking with technical assistance. 14% of patients who are mostly quadriplegics remained heavily dependent on a third party in activities of daily living.

## IV. DISCUSSION

Apart from the staggering number of deaths linked to traffic accidents, the care of accident victims, mainly young and uninsured paraplegics and tetraplegics, is heavy from the point of view of the mobilization of medical personnel, nurses, physiotherapists, occupational psychologists and switchgear, from the point of view of the resulting deficiencies and handicap generating supported by the social system (disabled card) as well as the financial investment of care structures. The slightest slackening of the nursing staff, the entourage or the patient himself leads to a loss of knowledge which exposes him to orthopaedic neglect and the dreaded complications of decubitus which threaten the vital prognosis.

Once faced with everyday reality, the "architectural barriers" are the first obstacle that our patients on wheelchairs encounter, whether at home: door frames too narrow, vegetable gardens and sinks too high, impractical stairs, absence space to handle the wheelchairs..., or outside: sidewalks, broken pavement, absence of slopes, insufficient or non-functional elevators,

inaccessibility to public transport are only examples of obstacles that complete social and professional isolation of the patients and makes their daily lives more fragile.

On the other hand, with the modernization of family life, the reduction of the family unit and the permanent unavailability of a caregiver, we were able to follow our patients externally for the first two years and then we lost them from view. It should also be said that with the hospital burden, all pathologies of the musculoskeletal system combined, physiotherapy programs are primarily allocated to new cases. Equipped local areas and / or home care for the most dependent people are therefore necessary to ensure continuity of care. The higher number of deaths in rural areas during RA supports this need for quality local care.

## V. CONCLUSION

Road accidents have far-reaching physical and economic repercussions for the victims themselves, their families and the country in general. These losses come from the cost of treatment and lost productivity for those who die or remain disabled as a result of their injuries, as well as for family members who have to stop working or going to school to care for the injured.

The availability, reliability and improvement of public transport conditions could facilitate congestion on the road and reduce accidents, especially during peak traffic times. Compliance with the highway code is an effective means of prevention, the establishment of the points license, the tachograph, the improvement of training with a professional certificate for professional users, education and awareness in schools are other possibilities to encourage.

Secondary prevention of the morbidity generated will be done more effectively through monitoring and care by well-equipped local structures or even home care for these patients with limited travel possibilities in order to promote a decent life, to prevent additional costs and to consider rehabilitation and reintegration into the workplace.



## VI. CONFLICTS OF INTEREST:

The author declares to have no conflict of interest

TABLE 1: INVENTORY OF LESIONS FOUND DURING THE INITIAL CLINICAL EXAMINATION

CLINICAL CHARTS AT ADMISSION	NUMBER OF CASES	%
<b>1. CLINICAL CHARTS:</b>		
A. Head Trauma	01	7
B. Polytrauma patients	02	14
C. Trauma to the spine:	13	93
Type of lesions		
Settlement fracture- Burst fr	09	69
Fracture-dislocation	04	31
Franckel Classification		
Franckel A	10	77
Franckel D	01	7.66
Franckel E	01	7.66
Undetermined	01	7.66
Level of injury:		
Cervical involvement	01	7.66
Cervico-Dorsal hinge	02	15.3
Dorsal	02	15.3
Dorso-Lumbar hinge	05	39
Lumbar	03	23
<b>2. ASSOCIATED LESIONS:</b>		
Face	01	07
Thorax	04	28
Abdominal	02	14
Limb trauma	01	07
<b>TOTAL</b>	<b>14</b>	<b>100</b>

TABLE 2: INVENTORY OF SKIN COMPLICATIONS: THE BEDSORES

Bedsore	Cases	%	Medications and care	Cost(dz)/unit	Cost(dz)/day	Duration of treatment	Cost (dz) / Hospitalisation/Pt
			Compresses isotonic saline	400 81	436	each pad each pad	19 500 23 450
	09 Pt	64	Hydrocolloid Adhésive	642		1 /3 days during 1 week	1926
			sulfadiazine argentic	264		After hydro-colloid pad	343
Sacred Bs	07	30.4	Hydrocolloid sylver	436	436	Everyday during 2 months	26 160 <b>T=71 380 /Bs</b>
Other locations	16	69.6	Hydrocolloid sylver	436	109	1 day / 2	6540 <b>T=51 760 /Bs</b>
anti decubitus mattress	14	100					<b>3500</b>
Total	23 Bs	100	2à3 Bs /patient	<b>151 035,5 dz / patient</b> for all Bs			

Dz= dinars. Bs= Bedsore. Pt=Patient

TABLE 3: COSTS OF TAKING CARE OF BLADDER AND SPHINCTER DISORDERS + PREVENTION OF THROMBOEMBOLIC COMPLICATIONS

Nature of troubles	Cases	%	Medications and care	Cost(dz)/ unit	Cost (dz)/day	Cost / hospitalization
bladder and sphincter disorders	12	85	Urinary catheters	220	1320	99 000
			10ml syringe	09	09	675
			Paraffin oil	72	4.8	360
			Urine bags	34	4.85	340
			compresses	327	163.5	12 262.5
urinary catheterization						<b>T = 110 636.25</b>
Layers	12	85		550	550	<b>38 000</b>
Antibiotics	14	100	T: 1200 to 17,800 Several cures / hospitalization			
Prevention of thromboembolic events	10	71	Low molecular weight Heparin	1150	575	<b>T= 51 750</b>

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