DEATHS WITH MEDICOLEGAL INTERVENTION AND ITS IMPACT ON THE CAUSE-OF-DEATH STATISTICS IN CATALONIA, SPAIN

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KEYWORDS
Mortality; Medicolegal autopsies; External causes of death; Information accuracy

Abstract
Introduction: The statistical forms corresponding to deaths that require judicial and forensic interventions contain a very high number of ill-defined causes of death. The objective is to show the results of data recovery from the forensic autopsies and to analyse the impact of this information on the cause-of-death statistics for the year 2013 in Catalonia (Spain).

Material and methods: Deaths with judicial intervention with an ill-defined cause of death according to the WHO coding standards were selected from the Catalan Mortality Registry. Information was recovered from the autopsy registers of the Forensic Pathology centres of the Institute of Legal Medicine and Forensic Science of Catalonia (IMLCFC).

Results: Deaths with judicial intervention represent 6% of total mortality in Catalonia, 42.9% due to external causes and 77% pertaining to ill-defined causes-of-death. There were 3,639 cases of death with judicial intervention, of which 43.4% (n = 1,578) were reviewed, resulting in information that improved the cause of death in 78.4% of cases. The information retrieved increased accidental poisoning by 61.3%, suicides by 32.6%, homicides by 28.9%, falls by 27.4%, traffic accidents by 22.7% and ischaemic heart disease by 5.2%, with the equivalent increase in the mortality rates from these causes.


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**Introduction**

Mortality statistics play a major role in demographics, social studies and the healthcare administration. Basic indicators such as the gross or age-adjusted mortality rate and life expectancy allow us to determine the level of a population's health, and to situate it in time and compare it between territories.\(^1\) Studying the cause-of-death is fundamental in public health, as it furnishes knowledge about disease among the population and permits the reallocation of healthcare resources within the context of service planning.\(^2\)

Most causes of death are related to the diseases suffered by the population, barring a small percentage encompassed within so-called external or violent causes, which nevertheless enjoy major social relevance.

**Conclusions:** The forensic autopsy information has a significant impact on cause-of-death statistics, especially external causes and ischaemic heart disease. A forensic report concerning the cause and circumstances of death, structured to facilitate further coding and the direct transmission of data to the statistical office, would be the best solution to prevent the loss of information currently experienced.

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**Las muertes con intervención judicial y medicolegal y su impacto en la estadística de causas de muerte en Cataluña**

**Resumen**

*Introducción:* Los boletines estadísticos correspondientes a las defunciones que requieren intervención judicial (DIJ) y actuación forense contienen un número elevado de causas de muerte mal definidas. El objetivo es presentar los resultados de la recuperación de datos a partir de las autopsias judiciales del año 2013 en Cataluña y analizar el impacto de esta información sobre la estadística de causas de muerte.

*Materiales y métodos:* Se seleccionaron del Registro de Mortalidad de Cataluña las defunciones con intervención judicial que tenían como causa de muerte unas determinadas afecciones mal definidas, según criterios de codificación de la OMS. Se recuperó la información de los registros de autopsia de los centros de Patología Forense del Instituto de Medicina Legal y Ciencias Forenses de Cataluña (IMLCFC).

**Resultados:** Las DIJ representan el 6% de la mortalidad total de Cataluña, el 42,9% de las causas externas y el 77% de las mal definidas. De los 3.639 casos de DIJ del año 2013 se revisó un 43,4% \((n = 1.578)\) y se obtuvo información que mejoró la causa de muerte del 78,4% de los revisados. La información recuperada aumentó un 61,3% las intoxicaciones accidentales, un 32,6% los suicidios, un 28,9% los homicidios, un 27,4% las caídas, un 22,7% los accidentes de tráfico y un 5,2% la cardiopatía isquémica, con el equivalente aumento de las tasas de mortalidad por estas causas.

**Conclusiones:** La información de las autopsias judiciales tiene un gran impacto en las estadísticas de causa de muerte, especialmente en las causas externas y la cardiopatía isquémica. Un informe forense sobre la causa y las circunstancias de la muerte, de manera que permita fácilmente su codificación posterior, así como la transmisión directa de estos datos a la oficina estadística serían la mejor solución para evitar la pérdida de información que se produce actualmente.

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of death issued on the preliminary report. As such, these results would not be reflected in the BEDJ.

The statistical information follows a parallel route to the judicial data, albeit with different times and the involvement of other institutions in the context of the territorial organisation of the statistics and health administrations. In the statistical circuit, the data from the BEDJ are processed without any subsequent updates following the final autopsy results. The deceased's demographic details are validated and the cause of death is coded in accordance with the standards established in the International Classification of Diseases (ICD-10) used in Spain since 1999.

Fig. 1 describes the process that these registers have followed since 2009, until they are converted into statistical data.

Numerous studies point to the complexity of the procedure and the flow of information as the cause behind the loss of quality and exhaustiveness of the data, in view of the time elapsed and the different agents involved, and confirm the scant validity of the data in some causes of death such as suicide and road accidents.

In Catalonia, an increase in unreported causes of death was detected (cause left blank) in deaths with an inquest (DWI) from 2009, the year in which the new BEDJ was implemented and the information circuit changed, thus leading to different measures to be taken. Since 2010, data from forensic autopsies regarding deaths in the city of Barcelona, which the Public Health Agency of Barcelona have been compiling since 1985, have been included in the Catalan Mortality Registry of the Department of Health. Moreover, this activity extended progressively to all DWIs in Catalonia as of 2011. This process has been made possible thanks to collaboration agreements between the Public Health Agency of Barcelona and the Department of Health, on the one hand, and between the administrations of Justice and Health of the Government of Catalonia, on the other.

This study presents the results retrieved from autopsy information corresponding to DWIs, whose causes of death reported in the BEDJ were ill-defined (see "Material and methods"), and analyses the impact of improving the basic cause of death on cause-of-death statistics. The purpose of this work is to illustrate the importance, for mortality statistics, of improving the DWI information circuits and forensic procedures.

**Material and methods**

The data referred to herein have been taken from the BEDJ provided by the INE to the Department of Health for DWIs occurring in Catalonia in 2013. The deaths of residents of Catalonia that took place in other territories are not included.

DWIs from the Catalan Mortality Registry were identified using the registration number assigned by the INE and from the type of register variable, both of which allow for a distinction between registrations of these deaths and other deaths. Of this group, those in which the cause of death was included in Chapter XVIII, on ill-defined diseases, according to the ICD-10 (revised codes: R00 to R99, except R95) were selected, with unspecific external causes (category X59), pulmonary oedema and cerebral oedema (categories J81 and G93) often used in the preliminary reports. For each of these deaths, information about cause of death was obtained from the autopsy register of all the divisions of the Institute of Legal Medicine and Forensic Sciences of Catalonia (IMLFC). The autopsy register contains the identification variables and the cause of the preliminary autopsy report.

In order to evaluate the effect of this intervention on general mortality, the percentage change between the number of final causes and the number of initial causes was calculated, as was the proportion of retrieved causes regarding the total per final cause of death group. Both indicators are defined as follows:

\[
\text{Percentage change} = \frac{\text{final causes} - \text{initial causes}}{\text{initial causes}} \times 100
\]

\[
\text{IMPACT} = \frac{\text{retrieved causes}}{\text{final causes}} \times 100\%
\]

**Final cause**: cause assigned to each DWI after the autopsy data have been included.

**Initial cause**: course assigned to each DWI in the BEDJ from the INE.

**Retrieved cause**: cause in which information from the autopsy has modified the initial cause.

**Results**

In 2013, 61,026 people died in Catalonia. Of these deaths, around 6% required an inquest. 3531 autopsies were performed at the IMLFC, and there were 3639 registers with an inquest identifier (DWI).

Of the 3639 DWIs, 1578 cases (43.4%) were reviewed according to the defined criteria, from which information was obtained. 78.4% of the registers (n = 1237) improved the coding of the initial cause, obtaining a cause that does not feature in Chapter XVIII of ICD-10. Nevertheless, some of the cases reviewed did not involve an improvement, as in 341 cases (21.6% of those reviewed) the final code remained in the chapter of ill-defined diseases.

The weight these DWIs have on mortality in Catalonia in some causes of death prior to the retrieval of forensic
Table 1: Total deaths and deaths that require an inquest, by cause group, before the retrieval of forensic information, 2013.

<table>
<thead>
<tr>
<th></th>
<th>CAT</th>
<th>%</th>
<th>DWI</th>
<th>%</th>
<th>(DWI/CAT) × 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
<td>56,950</td>
<td>93.3</td>
<td>1275</td>
<td>35.0</td>
<td>2.2</td>
</tr>
<tr>
<td>External causes</td>
<td>2269</td>
<td>3.7</td>
<td>973</td>
<td>26.7</td>
<td>42.9</td>
</tr>
<tr>
<td>Ill-defined</td>
<td>1807</td>
<td>3.0</td>
<td>1391</td>
<td>38.2</td>
<td>77.0</td>
</tr>
<tr>
<td>All causes</td>
<td>61,026</td>
<td>100</td>
<td>3639</td>
<td>100</td>
<td>6.0</td>
</tr>
</tbody>
</table>

CAT, Catalonia; DWI, deaths that require an inquest.

Table 2: Initial distribution of the 3639 deaths requiring an inquest, according to the place of death and residence, 2013.

<table>
<thead>
<tr>
<th>Place of residence (%)</th>
<th>Barcelona</th>
<th>Girona</th>
<th>Lleida</th>
<th>Tarragona</th>
<th>Catalonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcelona</td>
<td>93.8</td>
<td>9.3</td>
<td>3.8</td>
<td>8.2</td>
<td>67.4</td>
</tr>
<tr>
<td>Girona</td>
<td>0.6</td>
<td>71.5</td>
<td>0.0</td>
<td>0.2</td>
<td>9.3</td>
</tr>
<tr>
<td>Lleida</td>
<td>0.4</td>
<td>0.7</td>
<td>87.6</td>
<td>0.5</td>
<td>6.8</td>
</tr>
<tr>
<td>Tarragona</td>
<td>0.7</td>
<td>0.2</td>
<td>1.1</td>
<td>82.8</td>
<td>9.7</td>
</tr>
<tr>
<td>Spain</td>
<td>1.3</td>
<td>2.0</td>
<td>1.5</td>
<td>2.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Abroad</td>
<td>3.2</td>
<td>16.4</td>
<td>6.0</td>
<td>5.5</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Table 3 presents the characteristics of the DWIs prior to the retrieval of information. Two thirds of the cases correspond to male deaths, and almost half are aged between 35 and 64 years, although there is a small proportion of unknown ages. According to the chapters of the ICD-10, the most frequent causes of death are those in the group of ill-defined diseases, followed by external causes and circulatory system diseases.

Table 4 shows the impact of retrieving forensic data on the causes of death with the greatest changes. The categories with a substantial percentage change (PC) following the retrieval of information are the ill-defined causes (PC: −61.1%), which diminish, whereas the number of cases in other groups increases, such as external causes (PC: 22.5%) and, to a lesser extent, circulatory system diseases (PC: 3.2%) and ischaemic heart disease (PC: 5.5%). The final impact on statistics is significant, mainly in the group of ill-defined causes (−157%), and other groups increase as a result, such as the external causes, in which 18.4% of the final cases are so thanks to the information retrieved. The most specific causes in the external causes group are those that present a greater percentage change and impact on the overall statistics, such as accidental intoxications, suicides, accidental falls and road accidents.

Discussion

This article presents a description of the deaths that undergo an inquest and forensic intervention in Catalonia, as well as their impact on mortality statistics. Of all the deaths occurring annually, only a small number require a forensic intervention. However, an analysis of the specific causes reveals the importance of this information. The discrepancy observed in the number of autopsies performed and the number of DWIs could be the result of cases of natural death in which the coroner issues the death certificate as a doctor from the Civil Registry, without the autopsy being mandatory, since, irrespective of the type of forensic intervention, these deaths are reported in the BEDJ.

Of these results, it should be noted that the number of deaths occurring outside the place of residence is by no means negligible. Since the municipality where the death occurs determines where the autopsy will be performed, this discordance could entail a further loss of information due to the lack of access to related persons, personal circumstances and the data contained in the deceased’s medical history, which could prove useful to the work undertaken by the Forensic Pathology Service.

The results obtained through the retrieval of information directly from the medical-forensic source are very satisfactory, since they permit a huge reduction in the number of ill-defined causes in the overall statistics. In turn, they provide information on very sensitive causes that are traditionally regarded as somewhat unreliable in mortality statistics, such as intoxications, suicides, traffic accidents
Table 3  Initial distribution of the 3639 deaths requiring an inquest, according to gender, age and main causes of death, 2013.

<table>
<thead>
<tr>
<th>Gender (%)</th>
<th>Age (years)</th>
<th>%</th>
<th>Cause of death</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males (73.3)</td>
<td>0</td>
<td>0.4</td>
<td>Circulatory system</td>
<td>26.4</td>
</tr>
<tr>
<td>Females (26.7)</td>
<td>1–14</td>
<td>1.1</td>
<td>Respiratory system</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>15–34</td>
<td>8.4</td>
<td>Digestive system</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>35–64</td>
<td>49.3</td>
<td>Ill-defined</td>
<td>38.2</td>
</tr>
<tr>
<td></td>
<td>65–84</td>
<td>33.8</td>
<td>External causes</td>
<td>26.7</td>
</tr>
<tr>
<td></td>
<td>85 and above</td>
<td>6.7</td>
<td>Other causes</td>
<td>1.8</td>
</tr>
<tr>
<td>Not stated</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4  Result of the retrieval of causes and impact on mortality statistics by group of causes of death selected, 2013.

<table>
<thead>
<tr>
<th>External causes</th>
<th>Initial causes</th>
<th>Retrieved causes</th>
<th>Definitive causes</th>
<th>PC (%)</th>
<th>Impact (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road accidents</td>
<td>218</td>
<td>64</td>
<td>282</td>
<td>29.3</td>
<td>22.7</td>
</tr>
<tr>
<td>Accidental intoxication</td>
<td>47</td>
<td>75</td>
<td>122</td>
<td>158.3</td>
<td>61.3</td>
</tr>
<tr>
<td>Iatrogenesis</td>
<td>34</td>
<td>6</td>
<td>40</td>
<td>17.7</td>
<td>15.0</td>
</tr>
<tr>
<td>Falls</td>
<td>202</td>
<td>76</td>
<td>278</td>
<td>37.6</td>
<td>27.4</td>
</tr>
<tr>
<td>Asphyxia</td>
<td>42</td>
<td>11</td>
<td>53</td>
<td>26.0</td>
<td>20.7</td>
</tr>
<tr>
<td>Suicides</td>
<td>384</td>
<td>186</td>
<td>570</td>
<td>48.4</td>
<td>32.6</td>
</tr>
<tr>
<td>Homicides</td>
<td>32</td>
<td>13</td>
<td>45</td>
<td>40.7</td>
<td>28.9</td>
</tr>
<tr>
<td>Other external causes</td>
<td>1309</td>
<td>80</td>
<td>1389</td>
<td>6.1</td>
<td>5.8</td>
</tr>
<tr>
<td>Group total</td>
<td>2269</td>
<td>511</td>
<td>2780</td>
<td>22.5</td>
<td>18.4</td>
</tr>
</tbody>
</table>

Circulatory system

| Chronic rheumatic disease | 199 | 4 | 203 | 2.0 | 2.0 |
| Hypertension | 1843 | 28 | 1871 | 1.5 | 1.5 |
| Ischaemic heart disease | 4365 | 238 | 4603 | 5.5 | 5.2 |
| Heart failure | 2277 | 32 | 2309 | 1.4 | 1.4 |
| Other heart diseases | 3315 | 161 | 3476 | 4.9 | 4.6 |
| Cerebrovascular disease | 3907 | 33 | 3940 | 0.8 | 0.8 |
| Other circulatory system disease | 783 | 45 | 828 | 5.7 | 5.4 |
| Group total | 16,689 | 541 | 17,230 | 3.2 | 3.1 |

Ill-defined

| Group total | 1807 | −1104a | 703 | −61.10 | −157 |

Impact: proportion of retrieved causes regarding the total per cause group; PC: percentage change.

a  Causes that are redistributed in other cause groups.

and homicide. They also bring a relatively unknown aspect to light, namely under-reporting, which may affect ischaemic heart disease statistics; receiving this information could prove useful in estimating the incidence thereof.

The impact of forensic information on official mortality statistics has also been a regular international concern. Thus, in Finnish statistics, the greater impact of retrieving forensic information leads to a reduction in ill-defined causes and an improvement in endocrine system causes, with barely any modification on the unnatural causes. There is also a certain degree of improvement in undefined tumours and circulatory system diseases, and more particularly in ischaemic heart disease, albeit to a lesser extent than that observed in this study. Those that analyse external causes detect significant under-reporting of these causes in localised areas and a substantial reduction in unspecified accidents to the benefit of road accidents, falls, homicides and suicides, in this order.

A more recent study analyses the information source and procedure used in England and Wales to report the cause of death to statistics (coroner’s short form vs narrative verdicts) and their impact on deaths arising due to accidents and external causes. Although it does not find a significant effect on statistics, mainly with regard to suicide, it does note the importance of the coroner producing better-structured information so as to facilitate the coding of the cause of death by the statistics offices and thus improve quality standards.

In Spain, different works have demonstrated the under-reporting and/or lack of validity in the mortality statistics for different causes of death in the DWIs. There may be numerous reasons for this, although one fundamental cause identified is the complexity of the information circuit from the place in which the events occur up to the point where the data are transcribed on the statistical document. It has also been attributed to the time lapse between the
important 1-2009.pdf?idFile=4a2c7bf7-a8c8-
with
Although

information
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causes.
be
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report
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of
healthcare
For
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suggests
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final
autopsy
finding
in
the
statistical
information.
This
objective
difficult
accomplish,
since
national
and
international
statistics
institutions
undertake
a
commitment
to
provide
mortality
data
within
a
very
short
timeframe
after
death,
but
this
will
have
to
be
repeated
at
least
for
the
specific
studies
of
concrete
causes.

In
all
the
developed
countries,
cause-of-death
statistics
are
useful
for
establishing
and
evaluating
healthcare
policies,5
which
justifies
the
demand
that
they
be
reliable.

For
depth,
death
by
acute
myocardial
infarction
has
fallen
by
a
yearly
average
of
4.4%
years,26
with
a
marked
downward
trend
in
Catalonia,26
and
has
been
included
as
one
of
the
objectives
of
the
Health
Plan.5
Important
variations,
such
as
the
ones
observed
here,
due
to
the
information
production
process,
could
distort
the
evolution
of
mortality
for
this
degree
death
and
even
the
accomplishment
of
healthcare
objectives.

The
same
thing
occurs
with
other
public
intervention
policies
on
aspects
with
a
social
impact,
such
as
accidents
or
suicides.
In
Catalonia,
the
evolution
of
the
suicide
rate
in
the
last
20
years
was
initially
stable
or
downward-tapering,
although
more
recently
it
has
presented
a
sustained
increase.6
This
increase
partially
coincides
in
time
with
the
forensic
information
retrieval
work
undertaken
during
the
Department
of
Health
in
order
to
improve
statistics.12
Although
we
do
not
have
access
to
validation
studies
on
this
cause
for
the
entire
region,
recent
work
carried
out
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the
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of
Tarragona
do
not
confirm
this
upward
trend,
although
it
does
reveal
a
mean
under-reporting
of
16%,
with
a
very
erratic
evolution,
with
some
very
poorly-reported
years
(20% losses)
and
other
less
poorly-reported
ones
(2% losses).15

The
study’s
limitations
include
the
fact
that
it
only
describes
the
results
for
a
single
year
and
that
there
could
be
differences
in
the
information
retrieved
on
the
one
hand
due
to
the
improvement
intervention
and,
the
other,
to
organisational
changes
in
the
IMLCFC.

In
summary,
in
view
of
the
relevance
of
the
data
provided
by
forensic
procedures
to
the
healthcare
sector
overall,
the
information
noted
on
the
preliminary
autopsy
results
must
be
clear
and
explanatory,
underlining
the
circumstances
of
death,
if
external
causes
are
involved,
in
order
to
subsequen-
tly
permit
coding
by
means
of
the
ICD,
which
includes
a
large
number
of
codes
for
reference
purposes.
It
would
also
be
desirable
to
ensure
that
the
coroners
relay
the
information
about
the
cause
and
circumstances
of
death
directly
to
the
statistics
office
performing
the
coding,
in
order
to
avoid
transcriptions
between
the
different
documents
by
personnel
without
medical
training.
In
the
first
instance,
the
result
of
the
preliminary
autopsy,
and
preferably
the
final
information
too,
provided
that
this
is
feasible
and
that
the
delays
are
acceptable.

Conclusion

Deaths
that
require
an
inquest
or
forensic
autopsy
represent
a
small
proportion
of
the
deaths
that
occur
annually;
how-
ever,
they
account
for
half
of
the
external
described
and
around
three
quarters
of
the
ill-defined
described
in
overall
mortality
statistics.

The
retrieval
of
forensic
information
for
deaths
with
an
ill-defined
cause
has
a
very
significant
impact
on
mortality
statistics,
since
other
categories,
such
as
external
causes
(intoxications,
suicides,
road
accidents,
homicides)
and
ischaemic
heart
disease,
increase
the
mortality
rate.

The
clear
and
direct
transmission
of
forensic
information
to
the
statistics
office
about
the
cause
and
circumstances
of
death
appears
to
be
the
best
solution,
in
order
to
facilitate
coding.

Conflicts
of
interest

We
declare
that
we
have
no
conflicts
of
interest.

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