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Pertinence of electronic death certificates for real-time surveillance and alert, France, 2012–2014

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ABSTRACT

Objectives: In France, the early mortality monitoring, conducted by Santé publique France, the French National Public Health agency (SpFrance) (formerly French Institute for public health surveillance-InVS), is based on the administrative data provided by the National Institute for Statistic and Economic Studies (INSEE) and consequently does not allow analyses on medical causes of death. Since 2007, the physicians can certify deaths electronically. In this electronic system (Electronic Death Registration System; EDRS), the medical causes of death, in free-text format, are directly transmitted to SpFrance. In the future, these data could be used in a real-time surveillance system by medical causes of death. The objective of this study was to evaluate the pertinence of e-death certification using the following assessment criteria: timeliness, representativeness, and completeness of sociodemographic and medical information included in the e-death certificates.

Study design: This study consisted of a descriptive analysis of the information collected by e-death certificates recorded between January 1, 2012 and July 31, 2014.

Methods: The study quantified the temporal and geographical evolution of the deployment of the EDRS between 2012 and 2014. The timeliness of the system was estimated by calculating the delay between the dates of death and of data availability for analysis. Sociodemographic and death-related characteristics were described. The frequency of missing data was measured for each variable. The number of completed fields per certificate and the number of words per field and per certificate were calculated for the medical causes of death.

Results: Between January 2012 and July 2014, 77,776 e-death certificates were collected. A slight increase in the use of the e-death certification was observed during the study period, reaching 6.1% of the total number of deaths in 2014. Good national coverage was noted. Nearly 79% of e-certificates were submitted to SpFrance on the day of the death. We observed a high completeness of the e-certificates. The rate of missing data did not exceed 2.7% for sociodemographic variables. On average, 10 words, distributed in three fields, were used to describe the medical causes of death.

Conclusions: E-death certificates constitute a reactive source of information on medical causes of death. The deployment of EDRS is of major public health interest for the development of a real-time warning surveillance system of mortality by cause.

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Introduction

Since 2007, physicians in France have the possibility of certifying deaths electronically via a secured web application (<https://sic.certdc.inserm.fr>). This system addresses the need to improve the death registration system, according to the recommendations of the European working group on medical causes of death led by Eurostat.¹ The main purpose of the Electronic Death Registration System (EDRS) is to make medical data available within a few minutes of recording the death certificate. For this reason, it constitutes a valuable tool for real-time public health surveillance. Compared with paper certificates, this system improves the quality and the validity of data through the existence of filters and help provided by the computer interface.² The EDRS contributes to reinforce the confidentiality of data through encryption procedures and reduces costs by the dematerialization of certificates.³

Very few studies in the literature describe the implementation or the completeness of EDRS in other countries. According to the National Association for Public Health Statistics and Information Systems,⁴ 37 states used e-death certification in the USA in 2013, with variable levels of deployment. The deployment of EDRS is also heterogeneous across European countries.⁵ In France, in 2011, 5% of the national mortality data was certified electronically, and most e-death certificates were issued from public hospitals.³

E-death certificates, like paper certificates, include an administrative component and a medical component. The medical component is based on an international model defined by the World Health Organization (WHO)⁶ and divided into two parts. Physicians report the morbid sequence in part I (i.e. the course of events that lead to death, in descending sequence from cause a—immediate cause of death—to cause d—underlying cause of death) and, in part II, describe unrelated but contributory conditions on two separate lines.

To certify death electronically, physicians need access to a computer with Internet connection. In the current recording system, printing equipment on the location of the death is also required, since the administrative component of the e-death certificate has to be printed and sent to the city hall by mail. The medical component is electronically submitted to the French Epidemiological Center for the Medical Causes of Death (Inserm, CépiDc) and to Santé publique France, the French National Public Health agency (SpFrance) (formerly French Institute for Public Health Surveillance; InVS). The fields for causes of death, recorded in free-text by physicians, are then coded by CépiDc-Inserm according to the ICD-10.⁶ However, coding is a very complex process, and currently, coded medical causes are not available for several months.

To date, only the administrative anonymized components recorded in about 3000 city halls and provided by the French National Institute for Statistic and Economic Studies (INSEE) are used by SpFrance to monitor trends in mortality. The data, routinely collected by these city halls ('INSEE sample'), are integrated into the French Syndromic Surveillance System Sur-SaUD^{®7} and represent nearly 80% of the national mortality. However, the use of such data in an early warning system is partially satisfactory. First, more than 15 days are required to obtain complete data,³ limiting the timeliness of the

surveillance system. Second, this system provides neither information on medical causes of death nor specific data that could guide appropriate interventions. Consequently, early use of free-text data issued from the medical component of e-death certificates would improve monitoring of cause-specific mortality and could allow for real-time analysis by medical causes.

The aim of this preliminary study was to describe the data contained in e-death certificates using representativeness, completeness and timeliness as the main assessment criteria, with the final objective of using the data in an early warning surveillance system of mortality by medical causes in the future.

Methods

Data sources

In order to meet the goal of developing a real-time mortality warning surveillance system by medical causes, the anonymized mortality data were collected from the e-death certificates system implemented by Inserm-CépiDc. The use of this mortality data in the frame of public health surveillance and epidemiological studies has been authorized by the French National Commission for Data protection and Liberties (CNIL).

The data were used in their original form, as transmitted to SpFrance immediately after the death and before coding by Inserm-CépiDc. Consequently, medical causes of death were in free-text form. Analyses were based on the deaths that occurred between January 1, 2012 and July 31, 2014.

During the entire period, we collected 77,776 e-death certificates (77,030 general certificates and 746 neonatal deaths occurring before 28 days of life): 27,385 deaths in 2012, 30,614 in 2013 and 19,777 between January 1 and July 31 2014.

Mortality representativeness and timeliness of the EDRS

The representativeness was quantified through the measurement of the temporal and geographical evolution of the deployment of the EDRS between 2012 and 2014.

For each year, we counted the number of healthcare institutions that certified at least one death electronically. This indicator is used as a proxy-measure of the deployment of the system. For a better measure of the representativeness of the system, the proportion of e-death certificates in the total number of deaths in France was calculated for each year of the study period. The total number of deaths was provided by INSEE.^{8,9} It must be noted that the national mortality for 2014 was still provisional, at the date of the study. We also detailed geographical disparities in 2012 and 2013, measuring, for each department, the proportion of deaths certified electronically compared with the total number of deaths.

In order to evaluate timeliness of EDRS, a key component of the establishment of an early warning surveillance system for mortality, we studied the delay between the date of death and the date when data from e-death certificates became available to SpFrance. We compared this delay with the transmission delay for administrative data issued from the INSEE sample, currently used by SpFrance in the warning surveillance system for global mortality.

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