

ORIGINAL ARTICLE - PUBLIC HEALTH

ASSESSMENT OF MEDICAL CERTIFICATION OF CAUSE OF DEATH
IN TWO INSTITUTIONS (X & Y) OF A DISTRICT
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INTRODUCTION : Mortality statistics data is collected from Medical Certification of Cause of Death (MCCD) form 4 (Institutional Deaths)/4A(non-Institutional Deaths) and is a legal document which records the diseases, morbid conditions or injuries which either resulted in or contributed to death along with the timeline (3). The statistics available in the developing countries is of relatively poor quality (5-7). The errors such as missing or incorrect cause of death found in MCCD form in India is more than 90% (10). There are no studies found assessing the medical certification in Tamil Nadu. Hence it was decided to take up the MCCD data from two institutions (one government and one private) and assess the data to understand the completeness and errors noted in certification.

METHODOLOGY : It was a descriptive cross-sectional study in two Institutions (one government and one private) X & Y in a district from Tamil Nadu. One institution from government and private institution with highest number of deaths among all the institutions from the district was taken for the study and all deaths registered with MCCD was included for the study. The MCCD data from 1st June 2022 to 31st July 2022 was collected as soft copy from the two institutions. The data was analysed by State Nosologist for each record using the Bloomberg MCCD rapid assessment tool and entered and coded in a excel sheet. Demographic variables, completeness and error frequency of the records are calculated using proportions.

RESULTS : The total number of records taken for study was 1032. The total number of records from Institution X in 280 and Institution Y is 752. The time interval in any of the illness was recorded in 161 (57.5%) records in Institution X and 21(2.8%) records in Institution Y. The Records in which multiple causes were recorded in any line of Part 1 were 130 (46.4%) records in Institution X and 428(56.9%) records in Institution Y. The Records with error (Incorrect or clinically improbably chain of events leading to death in part 1) were 174 (62.1%) records in Institution X and 483(64.2%) records in Institution Y. Overall certification in records with at least any one of the error in writing MCCD is 251(89.6%) in Institution X and 746(99.2%) in Institution Y

CONCLUSION : It was noted that there is a lacunae in completion of time intervals in any of the illness especially in Institution Y(2.8%). The major errors in MCCD form like mentioning the wrong sequence of deaths (62.1% in Institution X & 64.2% in Institution Y), multiple cause of death recorded in a single line(46.4% in Institution X & 56.9% in Institution Y) is found in both institutions in a considerable level. The overall certification without errors is better in Institution X (89.6%) compared to Institution Y (99.2%) but still the overall certification is poor in both Institutions which must be addressed. The only way to overcome this gap is to adopt a multifaceted approach (training of doctors (interns, postgraduate and faculty) auditing of MCCD & awareness on MCCD importance) which may improve the quality of MCCD data.

KEYWORDS : MCCD, Completeness, Death Certification errors

INTRODUCTION

Mortality Statistics play a vital role in the world. Mortality statistics is used for monitoring and assessing the health indicators especially from Sustainable Development Goals (SDG) which in turn helps for the progression and development of the country. It also acts as the guide for resource allocation.¹ Mortality statistics data is collected from Medical Certification of Cause of Death (MCCD) forms. It is the only reliable cause specific source for mortality statistics in India. It is a standard format introduced by World Health Organization (WHO) in 1948 to bring uniformity in MCCD.²

MCCD form is issued in Form 4 for Institutional Deaths and form 4A for non-institutional deaths and is also a legal document provided by Registered Practitioners which

records the diseases, morbid conditions or injuries which either resulted in or contributed to death along with the timeline and comorbidities. MCCD document must be given mandatorily in the prescribed format properly and completely by the registered practitioner who has treated the deceased during their last illness as per Registration of Birth and Deaths Act (RBD) Act. MCCD has two parts capturing cause of death. Part 1 capturing the sequence of events leading



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to death which helps to know in which sequence more deaths happen and Part 2 capturing the comorbid conditions which guides us around the common risk factors for a particular cause of death.³

Globally less than 30% reliable death registration data alone is available.⁴ The statistics available in the developing countries is of relatively poor quality.⁵⁻⁷ India is a country with highest population, which has is a sample registration system to cover mortality statistics which does not covers entire population.⁸ The coverage of MCCD in India is 22.5%.⁹

The errors such as missing or incorrect cause of death found in Medical Certification of Cause of Death (MCCD) form in India is more than 90%.¹⁰ Tamil Nadu is one among the major states with highest mortality statistics coverage (43%).⁹

There are no studies found assessing the medical certification in Tamil Nadu. Hence it was decided to take up the MCCD data from two institutions (one government and one private) and assess the data to understand the completeness and errors noted in certification.

OBJECTIVE

To identify the completeness and frequency of errors from the MCCD certificates provided by the two institutions (one government and one private) X & Y using Bloomberg MCCD rapid assessment tool from 1st June 2022 to 31st July 2022 in a district of Tamil Nadu.

METHODOLOGY

STUDY DESIGN : The study design was a descriptive cross-sectional study of the MCCD records in Institutions X and Y in a district of Tamil Nadu State for the period 1st June 2022 -31st July 2022. One institution from government and private institution with highest number of deaths among all the institutions from the district was taken for the study. The study population taken for this study was any deceased registered in CRS in two institutions X & Y from the study area during the study period was taken. We included all the deceased with MCCD record from the two institutions registered in CRS were taken for the study. The sample taken was 1032. There are two type of errors in MCCD form. Major errors which constitute multiple causes recorded in any line of part 1, Incorrect or clinically improbably chain of events leading to death in part 1, Impossible underlying cause entered in the lowest used line of part 1. Minor errors constitute Abbreviations, time intervals of illness, legibility of certifier name.¹⁶

DATA COLLECTION: The MCCD data was collected as soft copy from the two institutions X and Y. The data was analysed by State Nosologist for each MCCD using the Bloomberg MCCD rapid assessment tool and entered and coded in a excel sheet.

DATA ANALYSIS: Data was entered in MS EXCEL by Nosologist and analyzed by calculating proportions regarding the Demographic variables (gender, age), completeness of variables (Age and gender of deceased, date of death, date of certification, name of certifier, cause of death, Time interval of any illness, circumstances missing for deaths due to external causes like accident or injury, additional details for neoplasm cases) and errors (multiple causes recorded in any line of part 1, abbreviations, illegible handwriting, Incorrect or clinically improbably chain of events leading to death in part 1, Impossible underlying cause entered in the lowest used line of part 1, certifier name not legible) frequency of the records in MCCD certificate.

HUMAN SUBJECT PROTECTION: Our study got approved by Institutional Ethics Committee of Tamil Nadu Journal of Public Health; we maintained privacy and confidentiality in such a way that no personal data was used or revealed during analysis or report preparation & presentation. The institution or the district name is not revealed for privacy and confidentiality purposes.

RESULTS

The total number of records taken for study was 1032. The total number of records from Institution X in 280 and Institution Y is 752. The composition of male and female in Institution X is 175 (68.6%) and 80 (31.4%) and in Institution Y the composition is 482(64.7%) and 263(35.3%). The records available by age group when compared it was noted that the age group 46 to 65 years was higher in both institutions X (92(35.4%)) and Y (300(40.9%)). It was followed by age group 16 to 45 years in institution X (83(31.9)) and age group in Above 65 in institution Y (185(25.2)). The records from age group less than 1 year in institutions X (16(6.2%)) and Y (72(9.8%)) (Table 1). T

Table 1: Frequency of demographic characters in MCCD records

	Variable	Institution X	Institution Y	Total
Gender	Male n(%)	175(68.6)	482(64.7)	657(65.7)
	Female n(%)	80(31.4)	263(35.3)	343(34.3)
Age group (Years)	less than 1	16(6.2)	72(9.8)	88(8.9)
	1 to 15	7(2.7)	14(1.9)	21(2.1)
	16 to 45	83(31.9)	163(22.2)	246(24.7)
	46 to 65	92(35.4)	300(40.9)	392(39.4)
	Above 65	62(23.8)	185(25.2)	247(24.8)

The records were assessed for completeness with the variables like age of deceased, gender of deceased, date of death, date of certification, name of certifier, cause of death & time interval of Cause of death in Part 1. The age of the deceased were recorded in 260(92.9%) records in Institution X and 734(97.6%) records in Institution Y. The gender of the deceased were recorded in 255 (91.1%) records in Institution X and 745(99.1%) records in Institution Y. Date of death of deceased was recorded in all records. The date of certification by certifier were recorded in 276 (98.6%) records in Institution X and 426(56.6%) records in Institution Y. The certifier name were recorded in 265 (94.6%) records in Institution X and 607(80.7%) records in Institution Y. The cause of death was recorded in all records in Institution X and not recorded in 1(0.1%) records in Institution Y. The time interval in any of the illness was recorded in 161 (57.5%) records in Institution X and 21(2.8%) records in Institution Y (Table 2). The Records in which circumstances were missing for deaths due to external causes like accidents or injury (155 deaths) were 4 (25%) records in Institution X and 9(6.5%) records in Institution Y. The Records in which additional details such as site, morphology and behaviour were missing for Neoplasm deaths (35 deaths) were 2 (7.7%) records in Institution X and 1(11.1%) records in Institution Y. The Records without missing any variables were 129 (46.1%) records in Institution X and 10(1.3%) records in Institution Y (Table 2).

Table 2: Completeness of the MCCD form

Variable	Institution X (n=280)	Institution Y (n=752)	Total (n=1032)
Age of deceased recorded n(%)	260(92.9)	734(97.6)	994(96.3)
Gender of deceased recorded n(%)	255(91.1)	745(99.1)	1000(96.9)
Date of Death of deceased recorded n(%)	280(100)	752(100)	1032(100)
Date of certification recorded n(%)	276(98.6)	426(56.6)	702(68.0)
Name of Certifier recorded n(%)	265(94.6)	607(80.7)	972(94.2)
Cause of death recorded in form n(%)	280(100)	751(99.9)	1031(99.9)
Time interval of any illness recorded in any of line n(%)	161(57.5)	21 (2.8)	182(17.6)
Circumstances missing for deaths due to external causes like accidents or injury records n* (%)	4(25)	9(6.5)	13(18.4)
Additional details such as site, morphology and behaviour missing for Neoplasm as cause of death n** (%)	2(7.7)	1(11.1)	3(8.6)
Overall certification without missing any variables	129(46.1)	10(1.3)	139(13.5)

*The number of records with deaths due to external causes like accidents or injury are 155 (Institution X = 16 & Institution Y =139)

**The number of records with deaths due to neoplasm are 35 (Institution X = 26 & Institution Y =9)

The records were assessed for the errors noted in MCCD form. The Records in which Multiple causes were recorded in any line of Part 1 were 130 (46.4%) records in Institution

X and 428(56.9%) records in Institution Y. The Records in which Abbreviations were recorded in entries in any of the lines were 40 (14.3%) records in Institution X and 246(32.7%) records in Institution Y. The Records in which illegible handwriting were 34 (12.1%) records in Institution X and 170(22.6%) records in Institution Y. The Records with error (Incorrect or clinically improbably chain of events leading to death in part 1) were 174 (62.1%) records in Institution X and 483(64.2%) records in Institution Y. The Records in which impossible underlying cause entered in the lowest used line of part 1 were 21 (7.5%) records in Institution X and 57(7.6%) records in Institution Y. The Records in which certifier name not legible were 2 (0.7%) records in Institution X and 110(14.6%) records in Institution Y. Overall certification in records with atleast any one of the error in writing MCCD is 251(89.6) in Institution X and 746(99.2) in Institution Y (Table 3).

Table 3: Frequency of errors in MCCD form

Variable	Institution X (n=280)	Institution Y (n=752)	Total (n=1032)
Multiple causes recorded in any line in Part 1 n(%)	130(46.4)	428(56.9)	558(54.1)
Abbreviation used in entries in any of the lines n(%)	40(14.3)	246(32.7)	286(27.7)
Illegible Handwriting recorded in form n(%)	34(12.1)	170(22.6)	204(19.8)
Incorrect or clinically improbably chain of events leading to death in part 1 n(%)	174(62.1)	483(64.2)	657(63.7)
Impossible underlying cause entered in the lowest used line of part 1 n(%)	21(7.5)	57(7.6)	78(7.6)
Certifier name not legible n(%)	2(0.7)	110(14.6)	112(10.9)
Overall certification with any one of the above mentioned errors	251(89.6)	746(99.2)	997(96.6)

DISCUSSION

All the records with MCCD were taken for the study from the both institutions X & Y from the study period. There was no much difference in age in comparison between both institutions. The completeness among the age and gender of the deceased is 96.3% & 96.9% respectively. It was noted that a study conducted at Gujarat revealed 0.5% error in age variable while gender was mentioned accurately in all certificates while another study observed errors 1.26% and 0.76% in this respective context in India.^{11,12} The date of death of deceased was mentioned in all records.

It was noted in three studies done in India that date of death was mentioned in 96.6%, 99.9% and 95.9% records.^{11,12,13} The name of the certifier was recorded in 94.2% in our study and the date of certification was only in 68%. In a study done in India the certifier name was recorded in 100% records.¹³ The time interval in any of the illness was noted in 17.6% records alone and the number of records captured time interval is very meagre in Institution Y (2.8%). In three studies (two from India, one from South Africa) the time interval in any of

the illness is not available for more than 98 % records.^{14,15,16} It was noted that in our study 18.4% records had circumstances missing for deaths due to external causes like accidents or injury. A study from India had nil data on the circumstances for deaths due to external causes.¹³ As per our study 54.1% had records in which multiple causes recorded in any line in Part 1. It was higher than other studies like Madhao G. Raje in which it was 8% in India and 4% in Tsung-Hsueh Lu et.al in Taiwan.^{17,18} The use of abbreviation was noted in 27.7 % records in our study while in other two studies in India, it was 38.8 %¹⁴, 40 %¹³ and 29.2% in India.¹⁶ 19.8% records had illegible handwriting in our study while in a study done in India, it was 10.07 %.¹⁴ The Records in which Incorrect or clinically improbable chain of events leading to death in part 1 was 63.7% which is one of the major errors and most common errors in MCCD and has to be looked upon. In three studies done in India, it was 64.74%¹⁴, 89.3% in Azim, et al¹⁶ and 55% in Amul B Patel study.¹⁹ 7.6% records were found in which impossible underlying cause entered in the lowest used line of part 1 in our study while in other studies it was 17.3% in Nojilana et al¹⁵ and 41.3% in Azim, et al.¹⁶ The overall MCCD certification with atleast one of the errors in MCCD is 96.6% in which institution Y has higher error percentage compared to Institution X. A study by Haque et al in Pakistan, it was observed that 1% certificates had no errors²⁰. In a study by Patel et al from India. it was noticed that all death certificate had errors.²¹

CONCLUSION

The study was conducted in two major institutions (one government and one private) in a district from Tamil Nadu to assess the MCCD forms provided by doctors. It was noted that there is a lacunae in completion of following variables date of certification, mentioning time intervals especially in Institution Y(2.8%) and mentioning additional details for deaths due to external causes (18.4%) & Neoplasm(8.6%). The major errors in MCCD form like mentioning the wrong sequence of deaths (62.1% in Institution X & 64.2% in Institution Y), multiple cause of death recorded in a single line is found in both institutions (46.4% in Institution X & 56.9% in Institution Y) in a considerable level. The overall certification without errors is better in Institution X (89.6%) compared to Institution Y (99.2%) but still the overall certification is poor in both Institutions which must be addressed.

The only way to overcome this gap is to adopt a multifaceted approach which may improve the quality of MCCD data. The death certification even after being included

in curriculum for undergraduate medical course, it is not put in practice. A hands-on training session especially for interns, postgraduate and faculty may be implemented with emphasis on the importance of mortality data and implications of poor MCCD data.²² Along with this intervention regular auditing of MCCD should be followed by discussion with the doctor who has certified death. The doctors must have the awareness that medical certificate completion is a physician primary responsibility and by doing so it may have a greater impact on health and should know about writing a proper MCCD form through the physician manual on Medical Certification of Cause of Death provided by Registrar General of India.

LIMITATIONS

The study was undertaken in two institutions from whole of the state and for the shorter period of two months. Hence the results may not replicate the same when taken for whole state.

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CONFLICT OF INTEREST

None

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