Medical Certification of Death: Development and Feasibility of Deployment of an Online Course for Practicing Doctors

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Abstract: Introduction: Medical Certification of Cause of Death, a vital tool for country's cause-specific mortality data, is an important responsibility of all medical practitioners. Despite its criticality, training on accurate certification and coding of cause-of-death is not routinely offered to all medical practitioners in the country very early in their careers. While MCCD training is vital, a face-to-face, classroom-based (traditional) training faces varied hurdles. A low-cost course on certification of cause-of-death that is easily accessible and available to country-wide medical practitioners would majorly benefit by enhancing their knowledge on death certification procedures. Method: We designed and hosted an 8-hour online course on certification of cause-of-death to strengthen the capacity of medical practitioners in death certification and ICD 10-coding. About 209 doctors from across the country have taken the course over the last six months. Result: Increasingly, medical practitioners are open to online learning. Accredited, knowledge-based online courses are an excellent tool for Continuing Professional Development of medical practitioners.

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Key Words: Medical Certification of Death, online learning for doctors, cause-of-death certification, MCCD

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Introduction: Mortality statistics are imperative for the vital statistics system of a country. Medical Certification of Cause of Death (MCCD), an important responsibility of all medical practitioners serves dual purpose of being a permanent legal record of death and providing cause-specific mortality data of populations[1-3]. Cause-of-death data collected from these medical certificates is statistically analyzed to design better public health interventions that lessen the mortality and morbidity burden of specific diseases on populations. A complete, detailed cause of death information to ensure accurate cause of death statistics is hence extremely important. Despite the criticality of MCCD data and the introduction of the MCCD scheme decades ago, training on accurate certification and coding of cause-of-death is not routinely offered to all medical practitioners in the country very early in their careers. It is limited to few hours of medical certification procedures in the MBBS curriculum, very little practical exposure during internship and isolated one-off RGI training on MCCD for primary, secondary and tertiary level doctors with no feedback or follow ups.

Multiple studies on the effectiveness of cause-of-death certification by physicians point out to several errors and mistakes which lead to incomplete or inaccurate entry into these certificates. Confusion between the terminologies 'cause of death', 'mode of death' and 'manner of death', absence of time interval between the onset of disease and death, improper sequencing, using non-standardized abbreviations, lack of an understanding of the importance of death certification are identified as the most common errors[1,2,4-11]. Such incomplete, inaccurate data entry into the medical certificates will hamper public health surveillance of populations and impair research[4-11]. MCCD scheme implementation needs to be strengthened further by training medical practitioners to equip, enhance and strengthen their knowledge in ensuring adequate, appropriate and accurate medical certification of cause of death.

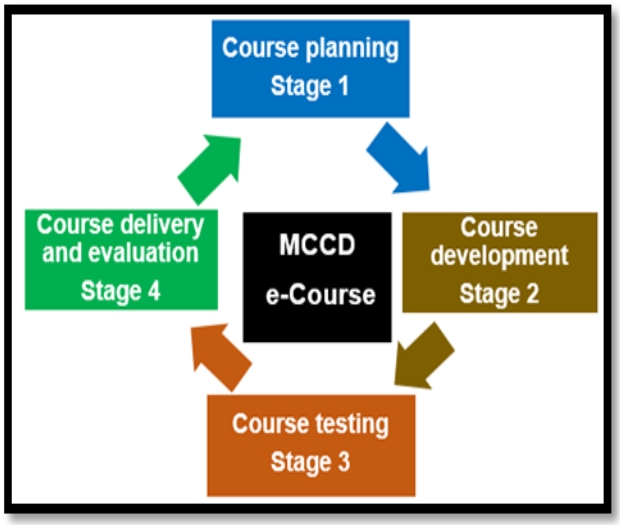
While training on MCCD is definitely the need of the hour, a face-to-face, classroom-based (traditional) training faces varied hurdles. It demands time away from routine clinics of busy medical practitioners. Travel time and distance issues to attend them, need for logistics arrangement for conducting them, lack of participant follow up and feedback for their improvisation and the need to mobilize huge funds to running them across the country are few setbacks of classroom-based training interventions[12-14]. Internet plays an imperative role in providing effective learning to medical students and professionals[15]. It is a flexible means of offering information to improve health care quality for diverse populations[12,16-19]. Increasingly health educators are advocating e-learning as a vital tool to build and strengthen capacities of health professionals[20-22]. Multiple studies evidence the effectiveness of e-learning in building and strengthening health workforce capacities, updating

them with new knowledge and skills in focused fields and fostering better job opportunities and promotions in underserved populations[23-24]. Aligning to this proposition, health professional educational institutions worldwide are moving towards adoption of information and communication technology (ICT) as a new mode for delivery of education[3,25-29]. Utilization of e-learning systems for knowledge and skills transfer in health care both in the urban and rural areas of developing countries has been gaining popularity.

This project employed internet to address medical practitioner's knowledge and skills gaps in MCCD. We aimed to design and host a low-cost online course on certification of cause-of-death that is easily accessible and available to medical practitioners across the country and would majorly benefit by enhancing their knowledge on death certification procedures.

Method: St John's Research Institute teamed up with Kentropy technologies to design and host an online course on MCCD delivered as a continuous professional activity to medical practitioners across the country. The entire project was conducted in 4 stages (fig 1)

Fig 1: Stages in Methodology



Stage 1 Course planning

This stage involved 2 main activities

Formation of an e-learning team: An e-learning team consisting of content expert, instructional designer and pedagogical expert and learning management system(LMS) specialist/ IT expert was formed to design, anchor and facilitate the entire course. A clear description of tasks to be performed and role of each individual with timelines was also created.

Developing a course process document: A course process document was developed by the team to guide the design, development and hosting of the course. This document had detailed guidelines on several aspects of the course (Table 1). Additionally, the respective team member who was responsible to employ and adhere to these guidelines was also specified. The project lead was responsible for the overall in-charge and coordination of the entire project.

Table 1: Course Process Document with guidelines

No	Content	Person responsible
1	a) Pedagogical guidelines to be adopted during content development b) e-learning approaches of the course c) course instructional strategy d) employing ADDIE model for instructional design	Instructional designer/ pedagogical expert
2	a) Development and design features of Learning Management Systems (LMS) b) Presentation layer of the course content c) Course hosting and delivery	IT expert
3	a) Course advertising b) Course registration	Course Admin
4	a) Course timelines b) Course evaluation plan, scoring and attempt criteria c) Course feedback mechanism d) Student life cycle in the course e) Costing of the course	Project lead

Since the plan was to host the course to medical practitioners from geographically dispersed locations across the country with diverse internet bandwidth settings, the effort was to develop a simple, interactive, easily accessible, self-paced, learner-centered, asynchronous e-learning course.

Stage 2 Course Development

Triangulation of content: Content to be employed to design the online course was finalized by triangulating currently available course materials from multiple sources

- existing face-to-face training materials from content expert
- review of literature on MCCD
- prior MCCD studies conducted at St John's Medical College and Hospital
- RGI physician's manual, CDC handbook of physicians used in US and UK and a review of WHO ICD-10 online modules.

Development of structure and content of the course: The finalized content was then employed to develop the course. This process is depicted in the table below(Fig 2 and 3)

Fig 2: Content development

Fig 3: Online adaptation

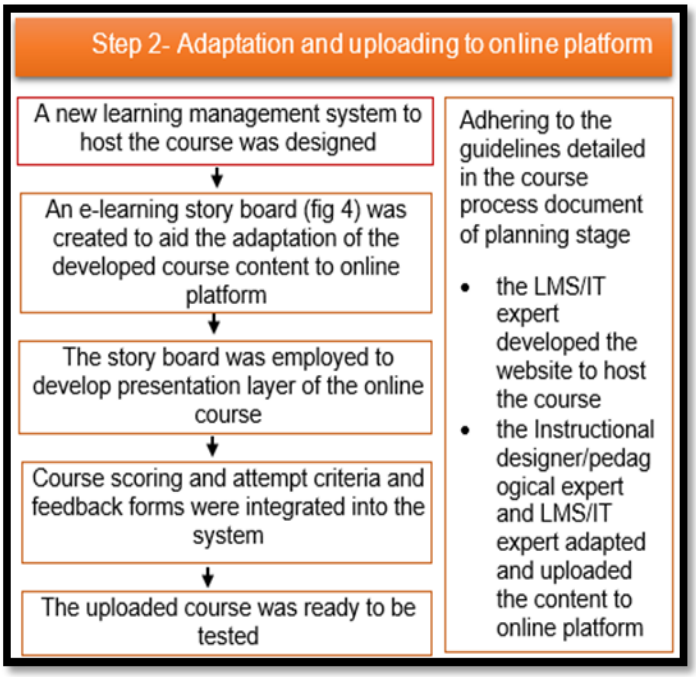
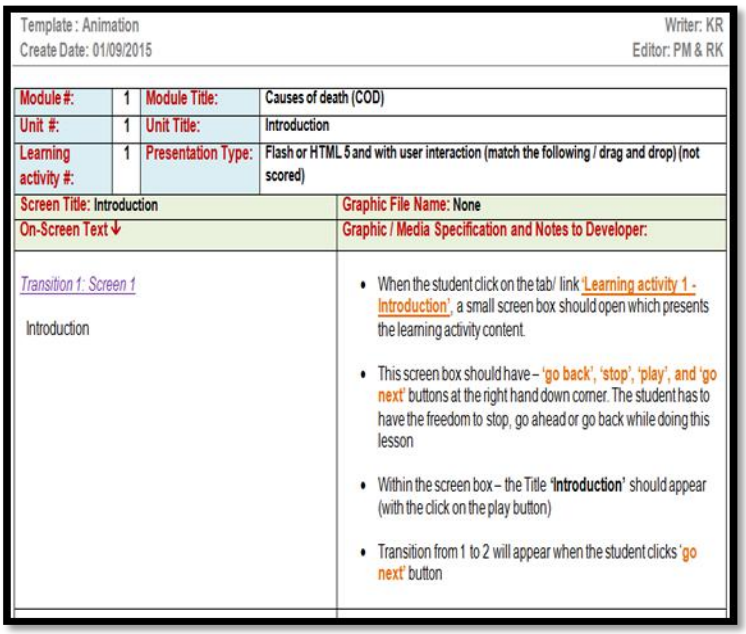


Fig 4: Example of e-learning story board



Template : Animation — Writer: KR
Create Date: 01/09/2015 — Editor: PM & RK

Module #:	1	Module Title:	Causes of death (COD)
Unit #:	1	Unit Title:	Introduction
Learning activity #:	1	Presentation Type:	Flash or HTML 5 and with user interaction (match the following / drag and drop) (not scored)

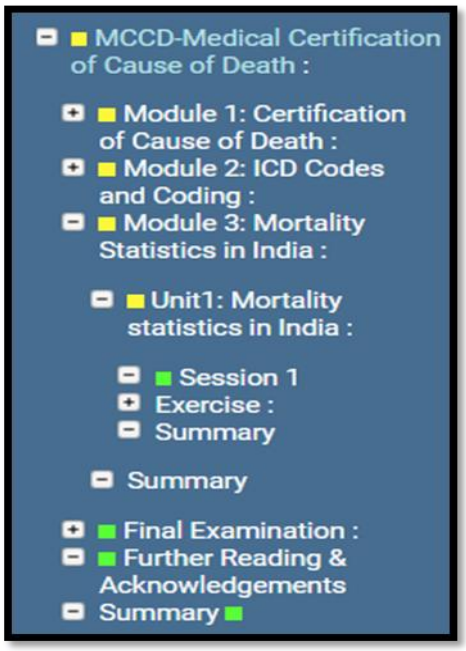
Screen Title: Introduction — Graphic File Name: None

On-Screen Text ↓	Graphic / Media Specification and Notes to Developer:
Transition 1: Screen 1 Introduction	• When the student click on the tab/ link 'Learning activity 1 - Introduction', a small screen box should open which presents the learning activity content. • This screen box should have – 'go back', 'stop', 'play', and 'go next' buttons at the right hand down corner. The student has to have the freedom to stop, go ahead or go back while doing this lesson • Within the screen box – the Title '**Introduction**' should appear (with the click on the play button) • Transition from 1 to 2 will appear when the student clicks 'go next' button

At the end of stage 2 we had an online course with (see fig 5)

- 3 modules
- each module consisting of 1-4 units and
- each unit consisting of 1-4 learning activities as
  - ✓ sessions (set of slides)
  - ✓ exercises (self-assessment exercises & formative assessments)
  - ✓ summary
- Final exam was the summative assessment of the course

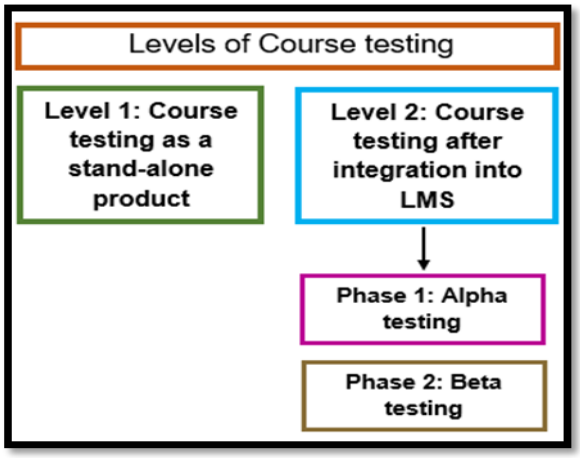
Fig 5: e-MCCD on LMS



Stage 3: Course Testing

Multiple levels of course testing was done to ensure quality assurance of the course. Course testing was primarily done at two levels (see fig 6)

Fig 6: Levels of course testing



Level 1: Course testing as a stand-alone product: As a stand-alone product, the developed course was tested for its flow, presentation and content clarity before its integration into LMS. This testing was done amidst thee-learning team. Once this was tested, and feedback was incorporated, it was later integrated into LMS.

Level 2: Course testing after integration into LMS. There were 2 phases in this level:

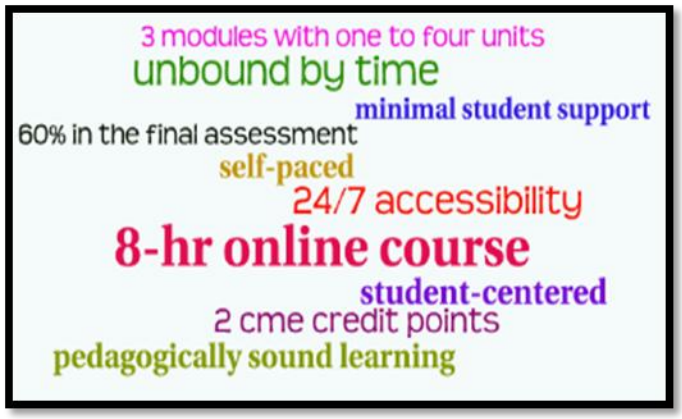
Phase 1 - Alpha testing done internally
This included internal testing of the prototype amidst the e-learning team as well as experts outside the team but within the department. The prototype was modified based on the feedback received.

Phase 2 - Beta testing done amidst community medicine post graduates and subject matter experts
The version finalised from Phase 1 was hosted and tested amidst community medicine post graduates at St John's medical college and external subject matter experts for a period of a month. The feedback was incorporated into the course.

Following the guidelines set during the course planning stage, as a parallel process the course admin team carried out course support activities like course advertising, website integration with payment gateway for online course fee payment, course registration, obtaining Karnataka Medical Council credit hours for the course, development and incorporation of course and help/navigation guide, feedback form and completion certificate.

At the end of stage 3, an 8-hour online course on certification of cause-of-death was ready to be hosted to medical practitioners across the country. The unique features of the course (see fig 7) included student-centered, self-paced, pedagogically sound learning, unbound by time or place with minimal student support and 24/7 accessibility to course materials from any part of the country. Participants were expected to complete all three modules and score 60% in the final assessment within a month's time to receive the course completion certificate with two Continuous Medical Education(CME) credit points.

Fig 7: features of e-MCCD course



Stage 4: Course Delivery and evaluation

The modified version from phase 2 of course testing was finally hosted to medical practitioners across the country (Fig 8).

Fig 8: Course page of the e-MCCD course

For the first batch course registration was open for a month. A welcome kit which included course guide and help/navigation guide was sent to all participants with successful registrations. Participant login credentials was sent a day prior to the start of the course. First batch of participants started the course on 1 Dec 2016 and completed it on 31 Dec 2016. The entire course materials were uploaded on the course page and participants could access it at their time and convenience. There was no limit on the number of times of participant's access into the course. A what's app group was created for the first batch. Participants could contact the facilitator either through mail or

phone for any doubts or queries. All participants had to complete the course by the last day of the month.

The participants were expected to fill up course feedback form to facilitate the course evaluation process. After successful completion, CME accredited course completion certificate was sent to all participants.

Currently the 13th batch of participants start the course on 1st of March 2018.

Results: The plan to design the course was initiated in June 2015 and finally delivered in December 2016. It was accomplished in stages. Initially, a smaller part of the course (module 1) was first developed, hosted and tested. This was followed by developing and testing of module 2 and module 3. All the modules were then incorporated as a complete course. The plans that were laid out initially underwent major changes to make the course as simple as possible. Use of a shared google document tool amidst the team during course design facilitated the course development.

A greater reach of practitioners across the country was ensured by posting and e-mailing course brochures to medical colleges, hospitals, state medical associations and professional networks, addresses of which were collected from MCI website, friends and colleagues. A visit was also made to local medical colleges to announce the launch of the course. Additionally, course brochure was advertised on institute's website and in major journals. Since the course was/is accredited with local medical council, the course has regular set of participants who enroll following the advertising at their website.

Adoption of the 2-step registration process consisting of online course registration and online payment mechanism simplified the registration process for participants. However, tie-up with a payment gateway and its website integration is time consuming and needs to be done much in prior to the launch.

Welcome kit consisting of welcome guide and navigation guide describing the course and their navigation eased the learning process for the participants. Participants could email or contact the course facilitator for any course-related issues. But overall student support in the course was kept minimal. The first pilot batch needed some hand-holding to complete the course. Once the Frequently Asked Questions(FAQs) section was populated with queries from earlier batches, participants were encouraged to refer to this section before contacting the support section. Once the course started, automated reminders on the start date and end date of the course and individual participant's progress in the course were sent regularly.

Beginning from December 2016, the course was hosted as a monthly program. The course was modified further based on the feedback from first batch of participants and hence was not hosted in January 2017. From December 2016 - August 2017,

eight batches of participants amounting to 209 doctors from across the country took up the course. From December 2016, the course has undergone four revisions to incorporate feedback from each batch.

Discussion: Medical Certification of cause of death scheme is a valuable tool to obtain cause-specific mortality data of populations. Complete and accurate entry of reliable information into these certificates is extremely important. Country-wide implementation of this scheme is hampered by deficient training resulting in medical practitioners with inadequate knowledge and skills of cause-of-death certification. Conduct of face-to-face, classroom-based MCCD training across the country requires greater financial, human, infrastructural and logistic resources. It also necessitates medical practitioners time away from their routine work.

Technology advancement, greater internet reach and the popularity of virtual and social media as a mode for acquiring information has laid foundation for employing ICT tools to disseminate knowledge on a larger scale. Web-based education expands learner's access to education and transcends geographical boundaries and time zones[30-33].Rapidly changing health care environment, advances in biomedical sciences leading to constant changes in diagnosis, management and treatment protocols, complexity of medical content and its modifications in line with recent advances necessitates continuing medical education/continuous professional education through newer approaches in its delivery[33].Additionally, continuous professional education delivered through online mode offers personalized and flexible learning opportunities to medical practitioners[29],helps them exercise control over content, learning sequence, pace of learning and time, provides a platform for individualized and self-directed learning, assures better updating solutions and standardization of content[23,34-37].Emergence of virtual universities and the adoption of e-learning technologies by conventional universities expands the scope for of e-learning approaches in medical education delivery[32]. This study focused on exploring online learning as a mode for continuous professional education of medical practitioners by designing and hosting a course to improve cause-of-death certification knowledge and skills among practitioners across the country. The course being a pilot project for the division took about a year and a half to be finally completed and hosted. Adoption of online mechanism for registration and payment made the participant registration simpler. The automated reminders sent to individual participants facilitated their learning process. Often there were participants who needed hand holding to overcome the fear of learning in a virtual learning environment. Simple format of the course, flexibility and accessibility of the course were prime factors that eased learning in the course. The accreditation of the course to state medical council was an added benefit.

Conclusion: Accredited and need-based online courses are an excellent tool for Continuing Professional education of medical practitioners. Increasingly, medical practitioners are open to online learning. Utilizing online learning as a mode of delivering continuous professional education expands opportunities for medical practitioners to build on newer advances in the field. Designing such online courses requires institutional readiness in terms of supporting resources – human, technological and infrastructural resources; but investing time and personnel will yield greater results in years to come.

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