A PRECEDE-PROCEED Approach in the Advocacy for Computer-based Education on Correct Medical Certification of Cause of Death among Physician-Learners

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ABSTRACT

Objective. Mortality data is a critical input to public health decision-making and planning. Yet, about 36% of underlying causes of death reported by physicians in 2018 are considered garbage codes, not useful in analyzing public health and mortality (PSA, 2018). We used the PRECEDE-PROCEED approach to develop, implement, and report an advocacy and education Project to improve training on medical certification of cause of death (MCCOD) among senior medical students and interns.

Methods. An MCCOD Instructional Design and eLearning course was introduced and validated in 33 medical education institutions. Lessons enhanced these education materials and are proposed for nationwide adoption. In the middle of the COVID-19 pandemic, the Project fast-tracked the training of physician-learners on the correct cause of death reporting and certification.

Results. Awareness of correct MCCOD and its personal and public health value reached at least 4000 learners, over a hundred medical faculty, and all deans of medical colleges in the Philippines.

Conclusion. The PRECEDE-PROCEED Model provided a clear and practicable framework for the advocacy and education efforts to train senior medical students and interns on MCCOD. It can similarly guide other medical education innovations by defining predisposing, enabling, and reinforcing factors then considering these factors for intervention strategies, implementation, process evaluation, outcome evaluations, and impact evaluations.

Keywords: eLearning, MCCOD, remote learning, advocacy, medical education, PRECEDE-PROCEED

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INTRODUCTION

Mortality data is a critical input to health decision-making and planning. Yet, the Philippine Statistics Authority (PSA) reports that up to about 36% of causes of deaths reported by physicians in 2018 are considered to be of no use for public health management and policy. The physician has the central role for correct medical certification of cause of death (MCCOD). And while MCCOD is a standard process and task of a doctor, education on MCCOD is not standard.

To support the efforts of the Department of Health (DOH) and PSA to improve mortality data quality, a tripartite Memorandum of Agreement (MOA) was entered into

with the Association of Philippine Medical Colleges (APMC) in 2019 to ensure the instruction on correct MCCOD. The DOH Knowledge Management and Information Technology Service (KMITS), Knowledge Management and Civil Registration - Vital Statistics Division was in charge of the Project.

The DOH engaged the UP College of Medicine (UPCM) in the same year to transform currently available learning materials into an eLearning course intended for senior medical students and post-graduate medical interns (PGI). The PRECEDE-PROCEED Model of Health Promotion was adopted to guide the Project implementation and to lay the groundwork in sustaining correct MCCOD education for doctors throughout the Philippines.

This MCCOD Advocacy and Education Project has two main (process) objectives: to advocate among stakeholders the inclusion and sustainability of a more structured module on MCCOD in physician education and to develop a standard MCCOD Instructional Design (and teaching-learning materials) to guide medical educators. The latter included a ten-session eLearning Course meant for both pre-service and in-service physicians. Medical schools and general hospitals participated in the project, recognizing their critical role in the education and formation of future and current physicians.

eLearning as a scalable mode of teaching

eLearning uses communication technologies that use online learning resources.[1] A meta-analysis of 201 eligible studies between 1990 and 2007 showed the association of internet-based learning with large positive effects on learner satisfaction, knowledge, and skills as well as behaviors of learners, on patient effects compared with a control group with the traditional face-to-face modality of learning.[2] For this paper, computer-based education is used synonymously with eLearning.

The University of the Philippines (UP) Manila - College of Public Health, with the Memorial University of Newfoundland in Canada, conducted the first series of audio-video conferences in 1993. The conferences were geared towards health professionals in the Southern Philippines.[3] The UP Open University, established in 1995, pioneered online teaching and learning education in the Philippines.[4] The University Virtual Learning Environment (UVLê), managed by the UP Diliman Interactive Learning Center since 2008, is a learning management system (LMS) developed by the UP Diliman and used in other constituent universities (e.g., UP Manila, also UP Cebu, UP Baguio).[5]

The UPCM Medical Informatics Unit (MIU) embarked on its first internet relay chat in 1998, with 146 clinician-members of the Philippine Coalition against Tuberculosis, and successfully demonstrated that internet-based interactive continuing professional development is possible.[6] In 2003, the Unit launched the learning management system OSIRIS, or Organ System Integrated Medical Curriculum and Research Information System, for the UPCM to support the major curricular changes.

The adoption of computer-based education has been sluggish, despite pioneering efforts, policy support, and resources by the UP. When the MCCOD Project was implemented in 2019, UP medical education was largely conducted face-to-face. Only a handful of innovative faculty members ventured into using UP's OSIRIS, UVLê, or the more recent UP Manila Virtual Learning Environment.

The global COVID-19 pandemic declared in 2020 was a game-changer, unceremoniously pushing much of education online, including pre-service and in-service physician instruction. The Project was timely in that it provided ready content for this abrupt shift into eLearning. However, in itself, a more structured and sustained MCCOD education is warranted for mortality data to be useful for improving clinical management and public health programming.

Baticulon et al. (2021) reported that medical students have technology resources for eLearning: of 3670 surveyed, 93% had a smartphone, 83% owned a computer, 79% had post-paid internet access, while 19% utilized prepaid mobile data. However, only 41% rated themselves as physically and mentally able to engage in online learning, as technological, individual, domestic, institutional, and community barriers prohibited them.[7]

MATERIALS AND METHODS

The PRECEDE-PROCEED Model for Health Promotion[8] has been utilized in over a thousand publications and at least an equal number of unpublished projects in school, community, clinical, and workplace settings.[9-12] A fundamental premise is that the determinants of health and health risks are multifactorial. Hence, a multidimensional and multisectoral approach is necessary for creating behavioral, environmental, and social change.[12]

The PRECEDE-PROCEED Model is a twin process of assessment, development, and implementation of interventions based on this assessment. PRECEDE assesses the Predisposing, Reinforcing, Enabling Constructs as part of the Educational and Environmental Diagnosis and Evaluation. PROCEED includes Policy, Regulatory, and Organizational Constructs in the Development and implementation of interventions in the realms of Education and Environment of the learner or target populations.

The PRECEDE-PROCEED Model was adapted in advocating computer-based MCCOD education among physician-learners in this UPCM Project for the DOH. Figure 1 depicts the project interventions.

PRECEDE

Phase 1: Social and Epidemiological Assessment

The social and epidemiological assessment involved assessing the need for a desired result of completion of death

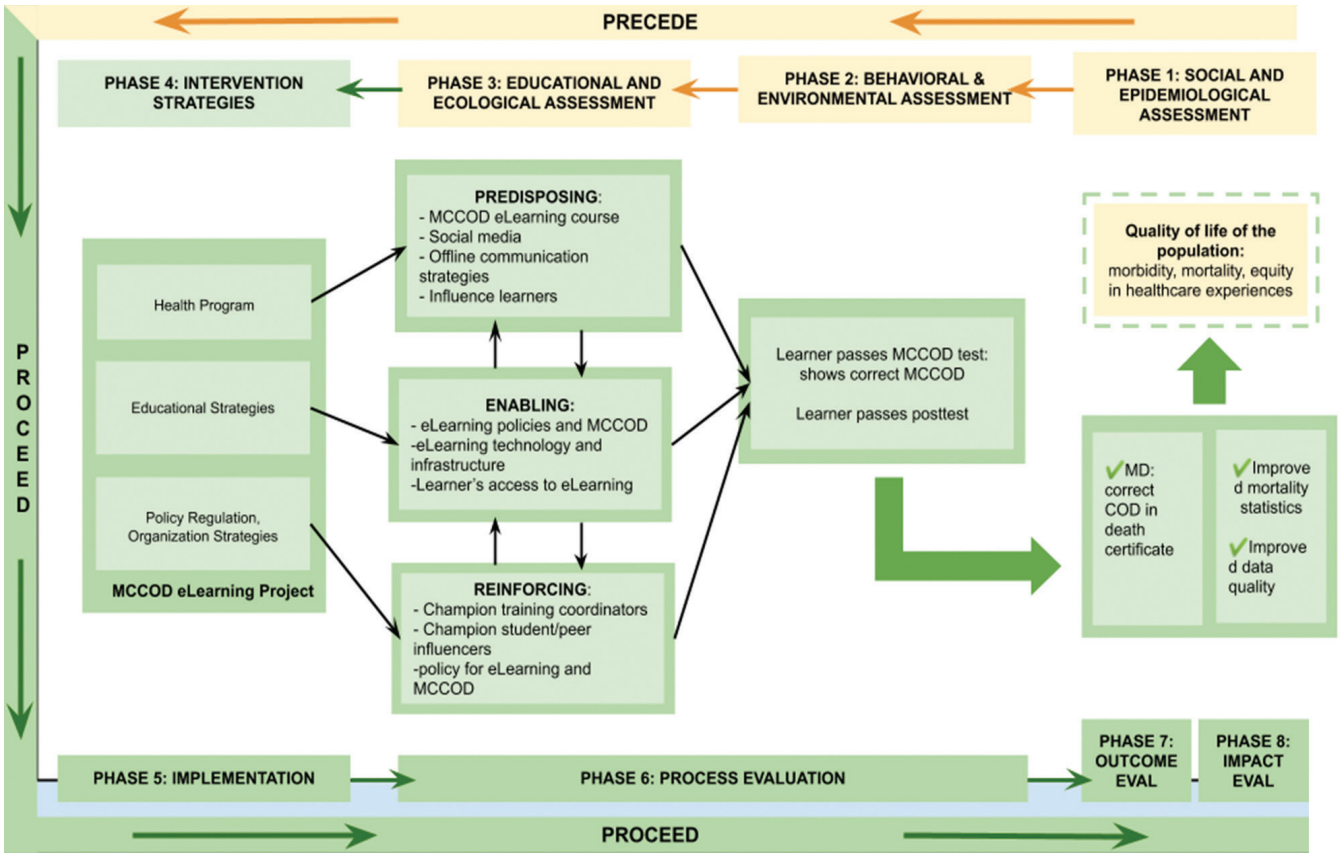

Figure 1. PRECEDE-PROCEED Model adopted for the MCCOD Advocacy and Education Project.

certification. A review of literature and primary data was done to gather information on mortality statistics in the Philippines from the DOH and PSA.

Phase 2: Behavioral and Environmental Assessment

An assessment of the conditions that need to achieve MCCOD education involves an exploration of the regulatory bodies that may have an influence on medical school education.

The pilot phase field-tested proposed intervention strategies on a smaller scale, lessons from which refined the knowledge products used for the expansion phase among a larger group of medical institutions. The lessons learned were used to engage other stakeholders to sustain gains in physician capacity-building.

The Project team conducted a situational analysis of participating medical training institutions. Its initial phase involved key informant interviews of the Project site coordinators, focus group discussions with institutional leaders, and PGI-learners. Ocular inspections of medical institutions were conducted to describe the infrastructure for eLearning. Data gathered was synthesized and improved the Project's situational analysis form as the Project expanded to more sites amidst the policy.

On its expansion to target more medical schools, another situational analysis survey was created to gather data from medical representatives regarding the existence of a department and professors who teach MCCOD, their time spent teaching MCCOD, materials that they use for MCCOD education, and the subject in which they include MCCOD education. This survey was done jointly to further do an educational and ecological assessment.

Phase 3: Educational and Ecological Assessment

Through formulating a situational analysis survey, the proponents gathered data from the medical school administrators and faculty, detailing the various factors involved in the educational and ecological assessment:

Predisposing Factors

Predisposing factors are characteristics of a person or a population (the physician) that motivate the desired health behavior — correct MCCOD. These factors include the physician's knowledge, beliefs, values, and attitudes shaped by homes, schools, significant others, institutions, and information available in their environment. Pre-existing access to MCCOD education in schools as well as the use of and attitudes towards eLearning through formal education, social media, offline communication strategies are predisposing factors identified in the context of the eLearning course.

Enabling Factors

Enabling factors are the environment, skills, and resources required to attain the specific behavior of correct MCCOD. These include educational policies, technology, internet access, teacher-student ratios, infrastructure, resources, and access to eLearning materials to enable appropriate MCCOD education.

Reinforcing Factors

Reinforcing factors are rewards or punishments that motivate towards the desired behavior. These include social support through peers, champions, and policies that reinforce the motivation to sustain behavior. For the medical students and physicians to learn correct MCCOD, advocacy strategies were two-pronged: downstream (targeting peers including medical students, medical education institutions, and medical professional societies that may be interested in signing a MOA for MCCOD education), and upstream, that is, champions and education policy-making or regulatory bodies. For the latter, the APMC, the Philippine Regulatory Commission (PRC), and the Commission on Higher Education (CHED) were identified.

PROCEED

Phase 4: Intervention Strategies

Here, best practices for advocacy and education activities patterned from the initial pilot phase were scaled towards a larger audience, targeted to be at least 28 medical schools.

ADDIE Model Instructional Systems Design Framework

The ADDIE model is a generic instructional model frequently cited in developing training delivered through various modes. It stands for Analysis, Design, Development, Implementation, and Evaluation. It is a systematic process of producing an instructional course or training program, following a step-by-step procedure to analyze, gather, and incorporate these data in creating materials.

The *Analysis* phase reviewed existing DOH and PSA materials on MCCOD education and scanned literature on the topic. It also considered the data gathered and presented previously: social, epidemiological, behavioral, environmental, educational, and ecological assessment, especially of the 33 Project participants (31 medical schools and two government regional medical centers). These, in addition to the input from the DOH, through the KMITS, public health experts, CRVS experts, and Project consultants who were education and clinical specialists, informed the *Design* of both the education intervention and communication advocacy strategies.

Phase 5: Implementation

The implementation phase involved education and advocacy activities after the pilot phase, through communications strategies done through initial emails to deans of all medical schools in the country detailing the project objectives. Email monitoring systems through Google sheets were used to track progress. Situational analysis surveys were then sent to the deans of medical schools or to their assigned representatives.

After the situational analysis survey were gathered, below are the criteria for consideration while selecting participant institutions during the advocacy process. To ensure fairness, responsiveness was given the primary consideration, including the schools on a first-come, first-served basis after requests for letters of commitment have been made, so long as there are adequate ratios of representation and readiness for eLearning.

Phase 6: Process Evaluation

This phase involves the assessment of whether the process of engaging medical schools and its faculty for MCCOD education enabled the objectives of the project. Module feedback from faculty and learners were gathered to improve the course.

Phase 7: Impact Evaluation

Learner results from the pre- and post-tests, social media engagement in peer-learner support initiatives, and engagements with educational policy agencies were assessed in terms of qualitative and quantitative results.

Phase 8: Outcome Evaluation

Years down the road, outcomes of correct mortality statistics ought to be obtained from the DOH and PSA.

Table 1. General Characteristics of Participating Medical Institutions in the MCCOD Advocacy and Education Project, 2019-2021

Characteristic	Description/ Presence of the following:
Responsiveness	MCCOD and eLearning Champions: • Medical educators who are known to be innovators • Participants in DOH MCCOD Training of Trainers for PGI Medical school deans who signified interest in participation • Timely submission of Project documents (letters of intent, College MOA with the DOH on MCCOD education) • Designation of MCCOD Faculty Member/s • Committed a specific number of students to test the MCCOD Module and Instructional Design
Readiness for eLearning	• Existence of an eLearning Policy • Prior eLearning implementation • eLearning infrastructure (internet connectivity within premises available to the medical community, available ICT/ computer equipment or subsidy for faculty or students
Representation and Equity	• Regional representation of Luzon, Visayas, Mindanao • A reach of small and large medical student populations in private and public schools • Schools with a bias for admission and provision of scholarships for special, marginalized groups

RESULTS

PRECEDE

Phase 1: Social and Epidemiological Assessment

The death certificate, a legal document, is the source of mortality statistics, essential for monitoring trends and patterns of diseases and risk factors for strengthening health systems. While the process of certifying the cause of death has been standardized and is a routine professional activity for physicians, inaccurate, incomplete, or poor-quality MCCOD has been well-documented in both developed and developing countries.[13]

In a review of 2007 Philippine census data, there was "only 70% completeness of death registration, under-registration of deaths is higher compared to registration of births".[14] The DOH and the PSA assessed the country's Civil Registration and Vital Statistics (CRVS) system in 2009, establishing birth and death registration rates, medically attended registered deaths, and identified ill-defined or unusable codes from registered deaths. A study conducted by Lucero et al. (2018), based on data collected a decade prior, found that 41.2% of death certificates reviewed (n=1052) "required a change in the underlying cause of death (UCOD), and 82% needed a new UCOD", indicators of poorly documented causes of death.[15]

Such a situation led to the strategic and investment planning on how to strengthen the Philippine CRVS, including education of physicians on correct and timely MCCOD. Likewise, efforts were invested in "strengthening of the vital registration network and establishing partnerships among civil registration stakeholders: National Statistics Office (NSO, the forerunner of the PSA), health agencies, universities, and local civil registrars."[14] Support from the World Health Organization Philippine Country Office (WHO-PHL) enabled nationwide regional forums of Municipal Health Officers and Local Civil Registrars for assessment and appreciation of linkages between civil registration, vital statistics systems, and health information systems, as well as understanding the need for better quality data for vital events.[16]

DOH Administrative Order 2020-008 on *Rules on MCCOD* was released in February 2020 and articulated the Philippines' CRVS commitment that by 2024, the country will reach at least: "90% of all deaths are registered, 85% of all deaths have a medically certified cause of death, 50% reduction in the proportion of deaths coded to ill-defined codes, and 85% of deaths taking place outside of a health facility and without the attention of a medical practitioner are determined through verbal autopsy."[17]

Priority action points by the DOH to enhance capacities of practicing Filipino doctors were to "(1) make strategic alliances with the academe, PRC, and CHED, (2) institutionalize MCCOD curriculum in all medical schools, and (3) develop a standard MCCOD module which is sustainable."

MCCOD Training began in 2014, involving community-based physicians of the Association of Municipal Health Officers of the Philippines (AMHOP) and the DOH Doctors to the Barrios (DTTB). In 2015, the DOH-KMITS produced the first version of the handbook on MCCOD, with the second version published in 2016. In parallel, the PSA and DOH KMITS published the first and second editions of the *Civil Registration and Vital Statistics Handbook for Health Workers.*

To promote MCCOD to pre-service medical professionals, the DOH, PSA, and the APMC signed a tripartite MOA in 2019 to ensure that PGIs and medical students are taught MCCOD. In the same year, the DOH again engaged the WHO-PHL to provide technical support to develop the PGI Practicum Guidelines on MCCOD and conduct the nationwide MCCOD Training of Trainers (TOT), supervisors, and educators of PGI from medical schools and hospitals.

The DOH recognizes that eLearning is a scalable and sustainable training modality for physicians. In 2017, the DOH Health Human Resource Development Bureau (HHRDB) set up the DOH Academy (https://learn.doh.gov.ph) as an eLearning platform where medical education modules related to public health programs are made available.[18]

The world reeled in 2020 because of the Coronavirus Disease 2019 (COVID-19) pandemic, and medical education had to make significant adjustments to digital learning. The medical faculty had to contend with multiple complexities that the pandemic brought. First, they had a major responsibility of patient care amidst a raging global pandemic of a novel COVID-19 virus, which posed a personal threat to their health and safety. Second, they also had to attend to their equally important responsibility of medical education, now using eLearning tools that they were previously unfamiliar with. Finally, the faculty also had to attend to their personal and family concerns.

We describe, in another technical report to the DOH (2021), the internet connectivity context of this MCCOD Advocacy and Education Project:[19]

> *"The Philippines is among Asia's weaker countries in promoting internet inclusion; it ranks 82nd in affordability levels of smartphones, and mobile data is low in the global context.[20] The Philippines ranks third (to Myanmar and Laos) in the ASEAN +3 Region in terms of cost of the internet: PHP 1,155 per Mbps monthly, compared with South Korea and Japan, which costs only PHP 20 and PHP 12, respectively.[21] With an almost comparable population, the contrast between countries is stark. While there are only two internet service providers (ISP) for the 110 million Filipinos (or 55 million Filipinos per ISP), three ISPs serve 51.7 million Koreans (17.2 million Koreans per ISP), and 16 ISP serve 126 million Japanese (7.9 million Japanese per ISP).*
>
> *The Philippines ranks 57th among 100 countries in internet availability and 73rd in terms of internet*

quality. At 3.6 Mbps, the country has the slowest average internet speed in the ASEAN +3 Region. In about 1000 Rural Health Units in the most remote regions of the Philippines targeted for the deployment of the RxBox telemedicine device of the UP, while internet speed ranges from weak to 4G/LTE, the majority are weak to 2G.[22] There are only 69 million users of the internet, thus ranking 62nd in 100 countries. The Philippines Department of ICT (DICT) conducted the country's first-ever National ICT Household Survey in 2019 and found that only 18% have internet access at home, only 30% use computers. The top five activities for using the internet, in decreasing order, are social networking, access to information, lifestyle/leisure, access to government websites, and learning. Health is noticeably absent. While some nations have already put forth that internet access to be a right, many low and lower-middle-income countries struggle with basic infrastructure. Though the same DICT 2019 Survey shows 95% of surveyed households have electricity, the (Philippine) National Electrification Administration reported 2,319,660 million homes that still have no access to electricity."[23]

Phase 2: Behavioral and Environmental Assessment

The two-year MCCOD Advocacy and Education Project was implemented from 2019 to 2021. The first pilot phase involved five medical schools (and corresponding training hospitals) and two DOH Regional Medical Centers hosting the post-graduate internship program. These medical schools, purposefully engaged to represent Luzon, Visayas, and Mindanao, are known innovators in medical education and participants in the DOH's MCCOD Training of Trainers for PGI. Since the Project intended to introduce the MCCOD eLearning Course, another criterion was the capacity for eLearning (i.e., existing computer-based education and infrastructure for eLearning).

In the Project's expansion phase, medical schools all over the country were called to participate. In 2020, the APMC listed 55 members nationwide; of these, deans of 30 medical schools (55%) signified intention to participate, including four who were involved in the pilot phase. It was important that these were interested, responsive, and had the required technical capacity to implement the MCCOD educational innovations. Table 1 describes the overall characteristics of participating institutions.

A total of 31 APMC-member medical schools (and their teaching hospitals) and two DOH Regional Medical Centers, involved in the instruction of PGI, were implementation sites. For the latter, many deaths occur in these regional hospitals, which attend to patients in their respective catchment areas (Visayas and Mindanao). Situated from north to south: four are in the various provinces of Luzon, the majority of the schools are in the National Capital Region (11), and the Visayas (10). Six are in Mindanao, where the poorest provinces in the Philippines are found. State-subsidized schools are a fourth of the participants; the majority are private (23 out of 31). The distribution and source of funding of participating education institutions reflect the national picture.

Before the Project's interventions, MCCOD was a topic in the basic medical curriculum taught in Legal Medicine and Medical Jurisprudence (in 12) or Family and Community Medicine (10). The rest taught this in various subjects (Pathology, Internal Medicine, or in multiple rotations). The majority of medical schools (16) introduced the topic in the third year, while five each introduced it in either the second or first year. These are essentially pre-clinical years. One school tackled MCCOD in the post-graduate internship, in partnership with hospitals wherein PGIs rotate. Interestingly, five (16%) medical schools reported that MCCOD was not taught in any subject in their curriculum prior to the Project.

The DOH MCCOD Handbook (2016)[24] was the resource most commonly cited by medical schools. The DOH MCCOD Training of Trainers, the traditional Pedro Solis Legal Medicine textbook (1987),[25] and various other materials were listed by respondents.

In general, MCCOD educational content is ideal for medical school, although there are a wide variety of strategies and depth. The general presence of institutional support bolsters having an on-demand eLearning course with standard content that can be made available to all medical training institutions nationwide.

The CHED, the Professional Regulatory Commission (PRC), and the APMC Student Network (APMC-SN) were identified and sought out as key stakeholders.

In an annual digital report published by We Are Social and Hootsuite, the total number of social media users in the Philippines is 76 million, 75 million are on Facebook, and hence became the primary advocacy avenue for student populations.[26]

Phase 3: Educational, and Ecological Assessment

In its expansion phase, practically all (29 out of 30) faculty representatives expressed knowledge of a school eLearning policy, especially in the midst of the pandemic. Half of them described various forms of institutional support such as monetary subsidies, on-campus internet access, and gadget subsidies for faculty. Electronic Learning Management Systems varied among the 33 institutions. The most popular ones were Google (Classroom, Meet, GSuite in 17 medical schools), the open-source Moodle (12), and Canvas (11); two schools described their own custom-built virtual learning environments. Some faculty cited the use of other eLearning tools: video conference platforms (Zoom, Microsoft Teams), learner performance assessment (Flexiquiz, Examsoft, Classmarker), and the DxR Clinician virtual patient software.[27,28]

There was internet access in all institutions, available to all constituents, and typically accessed by targeted learners through their own devices — mobile technologies or laptop computers. Internet connectivity in the locale, across the

Philippines, was reported to have an average of 45.50 Mbps (range of 4.53 to 361 Mbps) and 38.83 Mbps (range of 0.48-312 Mbps) for download and upload speeds, respectively. There was an average of 4 information technology staff, with a range of 1-12 staff per medical school.[27,28]

eLearning use in medical schools

For this computer-based education and advocacy Project, pioneering sites were chosen for their eLearning capabilities. The infrastructure to support this was available, such that computer labs, with a complement of technology staff, were accessible to the medical students, interns, resident physician-trainees, and medical faculty. On-campus computer facilities averaged 137 computers, ranging from 6 to 426 computers available to physician-trainees in the seven medical institutions. However, the fixed location poses a challenge amidst clinical work in the hospitals.[27]

With the COVID-19 pandemic, eLearning became the norm for schools to continue medical education.

When the lockdown was imposed in March 2020, the academic year was coming to a close, and the shift to online learning met many challenges. The MCCOD 1 Project specifically targeted those with resources to use a computer-based training module: three[27] out of five medical schools utilized Moodle as its learning management system (LMS). One Regional Medical Center[28] only started using Google Classroom since the quarantine restriction was imposed, while three[28] did not have an institutional eLearning platform when the situational analysis was made. Nevertheless, the targeted learners (medical interns, primarily) were already netizens who could navigate the internet.

PROCEED

Phase 4: Intervention Strategies

To address *predisposing* factors, meaning, to enhance future physicians' predisposition to correct MCCOD, the Project employed a two-pronged strategy: (1) the development and validation of the MCCOD Instructional Design, eLearning Course, and other teaching-learning materials to guide the medical faculty, (2) communications and strategy.

The Project advocacy strategy introduced *enabling* and *reinforcing* elements to sustain the desired outcome of correct MCCOD among medical professionals. It consisted of *downstream* and *upstream* advocacy activities. The former targeted the medical schools, the end-users of the MCCOD Instructional Design and Module. The Project provided focused support to the 30 participating schools through an assigned coordinator closely liaising with the designated medical faculty. With the course online, technical support to faculty and students was made available throughout the Project implementation.

Resources, organizational arrangements, and policy advocacy were designed and implemented so that physician-learners can experience a more rigorous MCCOD module.

The MCCOD Instructional Design considered three types of learners and the education needs of (1) pre-service senior medical students who had acquired basic medical science competencies, but little clinical experience; (2) the PGI, who had more but still limited clinical work, and (3) physicians in practice, who were legally mandated to complete the death certificates yet also need to be updated on MCCOD.

The must-know information embedded in the MCCOD eLearning course has been made available on-demand, especially for physician-learners with a multitude of tasks. Each of its ten sessions can be completed when schedule permits. The content was centered on three areas: building appreciation for good data quality and its medical and public health policy value, and fostering understanding of the crucial role of the civil registration and vital statistics (CRVS) system and its link with the health information system of the country. To ensure mastery of the rules of correct MCCOD, Session Ten featured clinical cases in Internal Medicine, Obstetrics and Gynecology, Pediatrics, and Surgery. The clinical cases were developed and shown to be at least a "just right" level of difficulty, validated by over 1200 learners in the Project's pilot phase. That is, at least 60% of typical physician-learners should have been able to answer the test questions correctly. Within the same pilot period, learner feedback was sought on content, ease of use, and usability of this computer-based training. The pre-test and post-test were guided by a Test Blueprint, which included a section with short-answer type questions that test higher-order thinking. It required the student to recall what is presented, analyze the clinical case, and *apply* the rules in correct MCCOD. The mean pass level was at 23.5 points out of a 40-item test.

The proposed and implemented instruction mode for the medical students was blended learning, with the asynchronous eLearning MCCOD course and synchronous small group discussions (SGD) facilitated by a medical faculty. The students had limited clinical experience, thus had to be guided more closely through paper cases. SGDs were conducted through an online audio-video conferencing platform. The MCCOD faculty evaluated the students' participation using the MCCOD SGD Rating Scale. The students submitted a reflection paper on insights after the SGD, assessed by the medical faculty using the Reflection Paper Rating Scale.

Phase 5: Implementation

Communications and Advocacy Strategy

Like the other components of the Project, the communications and advocacy strategy was guided by the analysis of the Project's context and resources. The team developed and implemented a communication strategy consisting of online and offline methods to raise awareness of the academic medical community on MCCOD and its value to patients and their families, the medical community, and public policy.

The Project developed, published, and disseminated the *400 Ways to Die: MCCOD Workbook for Physicians*[29] to supplement skill-building. The MCCOD instructional design and teaching materials (clinical cases, SGD guide, rubrics for student evaluation) tested and validated were all organized into the *MCCOD Module: Faculty Manual*. While posters and flyers were developed in the Project's pilot phase, intended for distribution in participating institutions, the COVID-19 community quarantines rendered these ineffectual when medical students and PGI were "sent home," and education was conducted online. The Project developed introductory and testimonial videos on MCCOD education as another form of media collateral.

The Project's pilot phase concluded in a month-long eight-part virtual conference series to present lessons learned. About a hundred participants attended for each day in the webinar platform, while the live stream audience had a total of 6,545 views.

Cognizant of the value of social media, the Project set up its own Facebook and Instagram pages. As expected, Facebook was popular and engaging, and more learners found this a convenient route for queries in the pilot phase. In the Project's second phase, the team shifted their focus on supporting the medical faculty directly, while the social media pages were maintained. By the end of the Project, the Facebook page reached 16,600 users. Viber was also used as a primary means of communication with the MCCOD faculty, the UPCM MCCOD Team, and the DOH-KMITS, and has proven effective in relaying announcements and addressing issues. Social media campaigns were implemented to promote the MCCOD course on various online platforms such as Facebook and Instagram. The *Instagram* account (instagram.com/mccodtraining), on the other hand, has fewer engagements than Facebook. With only 17 followers, it only has reached 291 users.

Phase 6: Process Evaluation

DOH-Medical School Three-Year MOA on MCCOD Education

The DOH entered into a three-year agreement with the medical colleges for a three-year collaboration on implemen-ting the MCCOD Instructional Design, officially endorsed by their institution's accountable officials. Thus, while the Project was time-limited, the DOH ensured similar technical assistance for these pioneering schools to continue and sustain this educational innovation within the next three academic years. Twenty-nine of 30 medical colleges in this expansion phase were able to submit this MOA within the Project period.

Medical Faculty: Pivotal in MCCOD Education

The medical faculty — key to the success of any medical education innovation — were especially engaged in testing the proposed MCCOD Instructional Design and Module. The ease of implementation should predispose and encourage them to continue including this in their standard course offerings.

The deans of 30 participating medical schools officially designated their respective MCCOD Faculty. These MCCOD Faculty underwent orientation and training on navigating the online *MCCOD eLearning Course,* including monitoring student performance in the eLearning Course, submitting reflection papers, and posting grades.

To expand the pool of MCCOD-ready faculty, a majority (25/30 or 83%) of these participating schools reached a total of 78 co-faculty members through online and in-person orientation on the MCCOD Module using Project-designed educational aids. These 108 were deemed to have the capacity to implement the MCCOD activities in the coming academic years.

The *MCCOD eLearning Course* was a requirement and prerequisite for the medical faculty before implementing the MCCOD Instructional Design among students. This requirement was intended to level off on cognates among teachers and learners. Likewise, as medical practitioners, this update in their education was also warranted. Despite this Project requirement, only about half of these 108 faculty members, i.e., 51 faculty members (48%), enrolled in the MCCOD eLearning Course.

The Project facilitated periodic (monthly within the Project period) meetings of the MCCOD faculty to share and learn best practices in Module implementation. The Project ensured technical and organizational support is available to implement the Project locally successfully. Updates regarding the Project and each institution's performance were shared as soon they were available. These events were also opportunities to build rapport among the institutions as a community of practice in eLearning, a relatively new mode of education to faculty used to traditional methods.

Module Feedback

In general, the MCCOD faculty were happy with the instructional design and thought the Project laudable in ensuring MCCOD is taught in a more substantive and better-structured manner. The effort was thought to be sustainable, i.e., that MCCOD would be taught the way it was introduced, guided by Instructional Design. They expressed the need for similar academic and technical support provided by the Project, especially the availability of the help desk when they need to grade their students and their access to the online module as non-editing faculty.

Generally, the learners were satisfied with the MCCOD Module for Clinical Clerks. Top suggestions included: (1) having more clinical cases and more complex conditions to be tackled in SGD; (2) provision of feedback on student performance, (3) improving the orientation and providing rationale on the student assessment materials; (4) controls for video speed and video markers in the eLearning Course.

Compared to graduate physicians, medical students needed closer guidance, hence the instructional design-defined supplementary learning strategies such as the SGDs. In contrast, PGIs and physicians were expected to apply cognates (in basic medical sciences, clinical sciences, and MCCOD) better. The post-test in the MCCOD eLearning Course was thus designed to be a summative evaluation for all learners.

Survey feedback from learners and teachers paved the way some revisions in content through the Advocacy Team, relayed to the Instructional Design Team and its consultants. Upon relaying the proposed changes from consultants, the Instructional Design was then finalized and recommended as the standard for nationwide implementation. Likewise, teaching-learning materials were enhanced and submitted to the DOH for their dissemination.

Phase 7: Impact Evaluation

Learner Results

This blended learning strategy was pilot-tested by medical faculty in schools representing the Luzon, Visayas, and Mindanao major island groups. Lessons from students and faculty enhanced the ID, teaching-learning aids, and methodology, which were to be subsequently implemented in 27 other medical colleges.

A majority (24 of 30 medical schools, or 80%) implemented the MCCOD Instructional Design as intended within the Project period. That is, these 24 schools were able to implement the module among a committed number of medical students who completed and passed the eLearning Course, participated in the SGD, and submitted their Reflection Paper, a total of 551 of 686 total committed learners (80%). The top-performing school had all 157 of its clinical clerks complete the Module.

For three schools, however, the number of learners who completed the Module was at or below 60% of their committed number (for 12, 22, and 28 medical students in each of the schools).

A total of 116 SGD on MCCOD were conducted by faculty among 686 senior medical students in 27 of 30 (90%) colleges, with a range of two to 30 SGD for each of these schools. The SGDs were well-appreciated by the student-learners and were given a very high learner satisfaction rating of 4.8 out of 5, the highest possible score. Students should be encouraged to complete the post-test before the SGD to learn from their mistakes and eventually complete the eLearning Course.

The eLearning Course was tested by about 4100 medical students and PGI in its two years of Project implementation (1,823 and 2,277 in its two consecutive phases). These numbers were 424% higher than the 966 targeted by the Project (280 PGI and 686 senior medical students in the pilot and expansion phases, respectively). The medical faculty were keen to disseminate information on the availability of the MCCOD eLearning course among other students who were not committed to be involved in testing the entire MCCOD module (which includes the SGD and reflection paper). Among the 686 committed learners in this expansion stage, there was a 63% increase in mean scores from pre-test (18.9) to post-test (30.9). A majority, 575 (83.81%), passed the post-test.

Top-performing MCCOD medical faculty and medical schools were honored in the Project's well-attended culminating online event. Seven colleges received awards: as institutions with the best written final report and the highest number of co-faculty engaged (as facilitators or co-facilitators of SGDs; the highest being nine co-faculty). The schools with the most SGDs implemented (30 SGDs for one school) and the highest number of committed students to complete the Module (157 students in another college) were also recognized. The pilot schools were commended as well.

Peer-Learner Support

Representatives of the medical clerks and interns per institution were engaged to liaise with colleagues, relay announcements, queries, and clarifications to the users from the MCCOD team and vice versa. As student leaders, their feedback was also sought on the MCCOD module.

The APMC-SN, with representatives in all medical schools nationwide, was enlisted to be peer advocates of correct MCCOD among medical students.

Communication activities were myriad: publicity materials related to the MCCOD were crafted and posted on the APMC-SN Facebook. The posts reached 14,589 people, 1,162 engagements, 177 reactions and likes, and 104 shares. APMC-SN hosted an *MCCOD Awareness Day*, disseminating publicity material and inviting Medical Student Councils in a caucus with DOH-KMITS and UPCM MCCOD Project Team.

The Project supported the Annual National Clinicopathologic Conference of the APMC-SN and advocated for including the Medical Certification of Cause of Death as a criterion in the competition. Specifically, the *cause of death correctness* (correctly identified the cause/s of death and the sequence of their appearance in the death certificate), and *data completeness* (filled up the MCCOD completely, including the time of occurrence of each cause). The APMC-SN invited MCCOD faculty from four medical schools to act as judges. Over 400 attendees were present during the online event.

Engaging Education Policy Agencies

Upstream advocacy meant securing the support of the MCCOD education policy stakeholders, i.e., the CHED and the PRC, for their roles in reinforcing correct practices through policy for pre-service medical education and in-service physicians' professional development.

The CHED and PRC were central in MCCOD education. Meetings were scheduled with leaders of the CHED and the PRC, with encouraging results.

The PRC, especially its Board of Medicine (BOM), has been a critical ally given its twin mandate to regulate the profession: the first being to oversee the annual Physician Licensure Examinations (PLE) on entry of young physicians. The PRC BOM leadership affirmed the inclusion of MCCOD as a topic in the PLE's Table of Specifications. Secondly, the PRC BOM also reinforces the quality performance of in-service physicians through a continuing medical education requirement. In the short term, it committed to strongly encourage medical specialty societies to include MCCOD in its roster in its continuing professional development (CPD) curricula, after which, a meeting can be called to explore if MCCOD can be a required CPD content.

CHED Memorandum Order 2016-18 declared CHED's capacity to support "national, regional, and local development plans" such as DOH Memorandum 2020-0008 Rules on MCCOD. CHED was compelled to "support continuing professional development in healthcare through updating curricula for quality healthcare and patient safety." Other relevant provisions of the CMO[30] should be aligned with competencies supporting "national, regional, and local development plans," as written in Republic Act 7722.[31]

CHED technical officers cited the possibility of close collaboration with the DOH on faculty training and adoption of the validated MCCOD Module for dissemination to all medical schools. The experience of proponents of Neglected Tropical Diseases (NTD) education was a model cited in the successful collaboration of the CHED and DOH. The CHED Commission en Banc Resolution No. 476-2018 was released, dated August 28, 2018, regarding the *Integration of NTD in the Internship Component of the Curricula for Medicine, Nursing, Medical Technology/ Medical Laboratory Science and Midwifery Programs*.[32] Further discussions on how the DOH and CHED can more closely work on this CHED policy issuance are in progress as of this writing.

Finally, the APMC, a key partner of the DOH and the PSA in this MCCOD education advocacy, endorsed the Project to the medical school deans. Specifically, the input of the President, Executive Director, and Chair of the Curriculum Committee were also considered. As a community of peers, the APMC and medical educators provided the opportunity to present accomplishments during the 2021 APMC Annual Convention and encourage further expanded implementation of this standardized MCCOD module to all medical schools. This presentation was received positively.

Phase 8: Outcome Evaluation

The outcome may not be apparent for years to come until the eventual improvement of mortality statistics have been observed. It is imperative that the overall statistics are noted to improve in five to ten years when the medical students who have been taught MCCOD become physicians who will sign of certificates of death.

DISCUSSION

PRECEDE-PROCEED Model as Advocacy Pathway

Advocacy is a sequential and logical pathway to assess the Project context and introduce the MCCOD eLearning Course as an intervention, with their individual, organizational, technology, and policy components. Advocacy is an initiative carried out by an individual or group of people by suggesting systematic efforts to achieve specific goals for public policy through mass media campaigns, speaking engagements, and publishing research.[33] Advocacy is backed up by facts and evidence-based research in the face of challenges, then recommends ideas that influence policy.[33]

The DOH KMITS has been steadfast and systematic in its campaign for better health data quality and better MCCOD by the physicians since 2007, when the assessment of the CRVS and health information system was first done.

The PRECEDE-PROCEED model adequately guided Project implementation and produced the desired effects: i.e., learners are engaged and enabled through the eLearning Course available on-demand. Likewise, medical schools and faculty were provided guidance through a standard MCCOD Instructional Design and more relevant teaching-learning aids; education policy agencies were more aware and supportive of the value of good data quality and more methodical physician instruction to support individual, medical science, and public policy goals.

Special Considerations: The COVID-19 Pandemic

The Project was launched in 2019 with a target of 280 learners. However, the COVID-19 quarantine hit, and the medical interns and students were pulled out from the hospital, compelling instructors to search for ready material fit for remote learning. The MCCOD eLearning Course has launched online and reached an additional 1,602 more physician-learners in the Project's pilot phase — 572% higher than originally intended.

In that sense, the COVID-19 pandemic was a significant positive contributor to the Project. Its second phase supported medical educators in more schools grappling with the abrupt transition to computer-based and online education — a relatively novel mode to the majority of medical faculty used to traditional teaching methodologies.

This statement does not discount the continuing adverse effects of COVID-19 on the physical, psycho-emotional, economic, and social aspects of the global community. This novel infection has had dire consequences: several designated MCCOD faculty members fell ill during the Project period. Further, these medical faculty were clinicians who continue to attend to patients, some have administrative responsibilities, and all are personally affected by the pandemic.

Filipinos as Digital Natives with Inadequate Internet Access

Recent studies found that the average Filipino spends ten hours a day online, four of which are allotted to browsing social media platforms.[34] Using social media to advance public health and advocacy programs can enable various projects to take flight. Instagram performance of the Filipino is categorized as "poor," with 11 million users and a 14% utilization rate, a point below the global average.[26] These numbers suggest that although various social media platforms are available to connect with the audience, Facebook has been the most advantageous because it enables wider reach due to millions of users. The statistics on the audience reach of the MCCOD Training pages concurs with these numbers.

While social media and internet access for medical students and interns were sufficient for this Project, one cannot forego that some locations may have intermittent connections, leading to students and faculty occasionally dropping out of the small-group discussion because of connectivity issues. The ability to save their progress in the online course was also helpful as a buffer for intermittent internet connectivity. In the 2020 Inclusive Internet Index reported by the Economist Intelligence Unit, countries were assessed on internet availability, affordability, relevance, and readiness. The Philippines placed 63rd in the overall ranking and 19th out of the 26 countries in the Asia Pacific Region.[35] According to the report, the Philippines is one of Asia's weaker countries in internet inclusivity, obtaining a rank of 57th in availability, 82nd in affordability, 59th in both relevance and readiness.[35]

Using Predisposing, Reinforcing, and Enabling Constructs for Implementation

Assessing the predisposing, reinforcing, and enabling constructs were integral to the Project's educational and environmental diagnosis phase. These assessments, plus technical expertise of education, clinical subject matter, and public health consultants, sufficiently informed Project interventions. It attested to the PROCEED phase, which included "Policy, Regulatory, and Organizational Constructs in the Development and implementation of interventions in the realms of Education and Environment" of the learner or target population.

While the deans and hospital directors, with their medical faculty, were clear champions, the midyear implementation of the MCCOD Module — as a Project implemented amidst the ongoing school year — meant that this Module might not have been part of the summative grade for the subject. A lack of formal grading might have contributed to students' lack of extrinsic motivation to complete the Module (the eLearning Course, non-submission of the reflection paper). It is expected that once the Module is embedded in the subject with corresponding grades in the coming academic year, that students will have a greater sense of urgency to complete the Module within the allotted time frame. These (31 medical colleges and two regional hospitals) can now introduce the Module at the most appropriate time in the academic calendar, and student performance appropriately recognized and rewarded. MCCOD eLearning materials are now hosted in the DOH Academy eLearning platform, https://learn.doh.gov.ph.

While the senior medical students and PGI were digital natives and readily adapted to (and even sometimes prefer) computer-based education, the more senior medical faculty needed support.

The Project underscores the critical importance of an MCCOD-ready physician-faculty charged with the responsibility of adequately guiding young medical students in honing their clinical competence. An MCCOD-ready physician-faculty is one who should have completed and passed the MCCOD-eLearning course, have been oriented/trained on the MCCOD Instructional Design, on best practices on its implementation, and can navigate the computer-based module.

The medical faculty must be updated with these "new" rules on MCCOD, and the main venue is the completion and successfully passing the post-test of the MCCOD eLearning Course. Technology issues encountered in the Project were resolved and should no longer be a deterrent for completing the training for any learner.

Further, what was helpful for the students — providing protected time to complete the eLearning Course — is recommended for future MCCOD faculty training. The fact that MCCOD Faculty were dutifully attending Project meetings should also be considered. What can be explored are blended and peer-based learning, wherein SGDs can be interspersed between the ten sessions of the eLearning Course. The positive and engaged attitude of the MCCOD faculty can be nurtured as they learn together as a community of MCCOD champions.

Five medical schools only had their designated MCCOD faculty oriented about the Module; these faculty were unable to conduct an echo session with their co-faculty. This issue is concerning because the faculty is a central and critical actor in education. Amid professional and social challenges, the lack of second-liners to implement the MCCOD module would be a risk to the sustainability of its implementation.

Celebrating Wins

Culminating events of the pilot and expansion phases were well-attended and were venues to disseminate lessons and celebrate professional and collaborative efforts. Top-performing MCCOD medical faculty and medical schools were honored in the Project's well-attended closing rites last June 2021, in simple ceremonies held online. Project accomplishments and lessons would not have been possible were it not for the MCCOD Faculty, who volunteered their time and effort to make the Project work. The contributions of all 108 faculty, especially the 33 institution-designated MCCOD faculty, were invaluable.

Online activities like this are economical and allow nationwide, and even international, reach. These reinforce the shared goals underpinned by the Project.

CONCLUSION AND RECOMMENDATIONS

This education advocacy for correct MCCOD has at its crux the development of physicians continuing their service to their patients even after their last breath. This collective professional task will produce more reliable mortality data to improve health in the community and the country where these patients reside. It reached 31 medical schools and two regional government hospitals charged with educating senior medical students on the cusp of joining the medical workforce. An awareness of correct MCCOD and its personal and public health value reached at least 4,000 physician-trainees, over a hundred medical faculty, and all the deans of medical colleges nationwide. The PRECEDE-PROCEED Model provided a clear and practicable framework for this effort.

Long-Term Plans and Sustainability: Lessons from the PRECEDE-PROCEED Model

Educational materials have been developed and validated to demonstrate efficacy in honing competencies of senior medical students, useful also for PGI and doctors in service. However, the content, including the pretest, post-test, and case analysis, should be reviewed annually and revised at least every three years to ensure accuracy and freshness, incorporating updates in medical and public health sciences and alignment with global policies. The *400 Ways to Die Workbook* published may be used as a case bank for the clinical discussion.

A cadre of 108 medical faculty has been made available to continue instruction on MCCOD. These faculty members and the inclusion of more MCCOD-ready faculty should be central to the expansion of structured MCCOD education. The medical faculty were multi-tasking with other clinical, educational, and administrative responsibilities; likewise, they also had concurrent personal and civic roles. Further, they were acknowledged to be less technology-savvy compared to younger medical trainees. Thus, they needed focused support — organizational, resource as well as policy reinforcement.

Faculty and students provided meaningful feedback on enhancing the MCCOD Instructional Design and educational aids, which are now endorsed and recommended as the standard instructional design for nationwide implementation.

The power of peer support and influence cannot be over-emphasized when introducing innovations. This emerging community of practice among these MCCOD educators of 33 medical institutions must be nurtured and expanded. Peer leaders among the learner population also must be drawn in as key stakeholders.

Engagement with the APMC-SN allowed even wider reach through social media. Creating incentives for learning through inter-school competitions increased the interest and necessity for learning correct MCCOD.

Advocating for support among educational policy-making bodies with regulatory capacities such as the CHED and the PRC is vital in establishing the credibility and further expansion of the MCCOD eLearning course, reinforced, sustained through policy. The MOA with the CHED must be pursued, especially the release of the CHED Memorandum Order on MCCOD Education. Continuous engagement with the PRC is needed to ensure that MCCOD is (a) continuously included in the Table of Specifications in the Physician Licensure Examination; (b) incorporated in the Continuing Professional Education activities of the medical practitioners, and eventually (c) become a requirement in the renewal of a license to practice.

The Project is distinctive in that the education materials were collaboratively developed, first involving a handful of innovators, then expanding to like-minded champions, and increasing in scale to engage more than half of all Philippine medical colleges nationwide. Using the PRECEDE-PROCEED Model to gather initial assessments to create best practices in intervention, implementation and assessment brought encouraging results. The model can be extended to other medical education innovations — to predispose, enable and reinforce desired medical professional behavior.

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