

Web based Analysis of Critical Medical Care Technology

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Abstract - The In-service Training Web-centred Delivery (ITWD) of medical data is a fundamental investment option for financial analyst that plays a critical role in supporting the competencies of medical practitioners. In this paper, a critical analysis of the training and education aspect of medical information was conducted in the process of identifying fundamental training methodologies for medical practitioners as Continued Professional Education (CPE). The paper also evaluates the possible evidences and results retrieved from CPE. This paper includes a literature review from many databases such as Cumulative Index, Cochrane Library and PubMed library for medical practitioners which includes the information published from 2011. The articles under review, selected in this research were used to retrieve quality reviews based on systematic analysis, programme analysis and randomized controlled trials for peer-reviewed articles published from 2011. In this paper, the research questions concentrate on the evidence that effectively support the educational frequency, media, setting and techniques meant to deliver the medical instructions for the CPE.

Keywords - In-service Training Web-centred Delivery (ITWD); Continued Professional Education (CPE); Medical Data.

1. Introduction

The requirements to enhance the efficiency and effectiveness of the pre-service medical education and the Continued Professional Education (CPE) which is the In-service Training Web-centered Delivery (ITWD) have never been easier to comprehend. The diminished international resources and pervasive fundamental shortages of professional medical practitioners have been paralleled by the introduction and explosion of medical data. Universities and medical colleges are continuously incorporating various methodologies for medical education to shift beyond the focus of a classroom setting. These learning opportunities are available for both the initial medical professionals and CPE, who are interested in expanding the training and education of healthcare professional beyond the typical classroom-based learning.

The incorporated review was formulated to review and identify the evidences that address the best practices in the delivery and design of the in-service education and training

interventions. The usage of the incorporated reviews is based on various analytical designs which might be added to the review's inclusion approach to permit for the inclusion of both quantitative and qualitative data. In this paper, five fundamental queries have been formulated in relation of the conceptual framework of CPE created by John Hopkin's school for evidence-centered practice centers of prior systematic analysis of CPE. So, this paper seeks to know about certain training approaches; frequencies of trainings; settings where training will happen; media sources utilized to deliver training for potential learning outcomes and the evidence concerning the required results such as skills, knowledge and changes in medical practices that might be retrieved from CPE. These practices can potentially utilize various frequencies, media and techniques.

In this research, the evidences indicate the utility of many approaches which allows for the incorporation of medical data and permit students to apply and process medical information. The case-centered learning, medical feedback, clinical practices and simulations are indicated as fundamental educational approaches. Didactic approaches which include passive training, i.e. lecture or reading have been considered to have minimal implications on training outcomes. Repeated interventions instead of one form of interventions have been indicated to be superior for the educational outcomes. The settings that can be compared to the workplace enhanced the skill performance and acquisition. The computer-centered learning might equally be more effective compared to live instructions and affordable when the best approaches are applied. Efficient approaches might amount to the enhancement in skill, knowledge outcomes and medical practice behaviors. However, there are minimal evidences concerning the direct linkage to CPE which potentially enhances medical outcomes. Limited quality information is present from minimal to medium income nations.

Training approaches are fundamental to educational outcomes. Repetitive and targeted interventions might amount to effective educational results. Settings have to be

chosen to effectively support realistic and relevant practices which also enhance efficiency. Media has to be selected in reference to the potentials meant to support fundamental training approaches and efficacy of the instructions. CPE might amount to enhanced training results in case efficient approaches are utilized. Limited information shows that there might also be an influence on the enhancing medical practice conditions and behaviors. The research actions required for well-established evaluations of culturally effective combinations of media, frequency, setting and approaches. These are some of the elements structured and evaluated based on the various levels of the medical practitioners in both middle- and low-income nations.

This research makes use of the inclusion and exclusion approach. With these methods, articles have been evaluated based on their relation to medical practitioners or CPE events. The articles used in this paper are based on the analysis of short-term assessment and evaluation of long-term results for the purpose of education. We incorporated the types of articles that are published in the English language. These methodologies provide priority to the journals that utilized the high-order analytical methods, certainly the meta-systematic analysis and reviews which are based on the experimental designs. The journals excluded from this research were qualitative evaluations, observational students, letters, editorial commentary and book chapters. The search approach used is based on the peer-reviewed and electronic journals analyzed between May and June 2011. These strategies were done based on the research published as early as 2000. A number of databases used include Cumulative Index, Cochrane

Library and PubMed library are relevant for the medical department.

2. Research Types, Quality Evaluation and Grading

The review of the research abstracts and titles produced more than 200 results. In this research, we identified the firm research evaluations present are based on a wide-range criterion which has structured the research methodology. The initial selection approach has been structured by the group of experts. Research inclusion and grading approach were adapted from the OCEMB (Oxford Centre for Evidence-Centered Medicine Board) which critically evaluates the evidence-centered frameworks [1]. Grading of the reviews incorporated in the systematic analysis was assessed and reported by researchers of the papers and was not evaluated in this incorporated research. In that case, in relation to the quality of the reviews in our reporting there are some priori judgements being structured.

One the prioritization of the research articles is complete; approximately 163 tier 1 publications have been evaluated by the superior public health practitioners to effectively evaluate the topical significance, grading and the research type. An overall of 61 tier 1 research evaluations have been chosen to be incorporated in the evaluation based on this second evaluation. Moreover, the hand search of the bibliography lists included in the published research has been done for the topics which have been underrepresented basically on the setting and frequency of the training activities. This analysis included about eight articles for an overall of 69 research evaluations, incorporating about 37 systematic journals and 32 random guided trials (Fig 1).

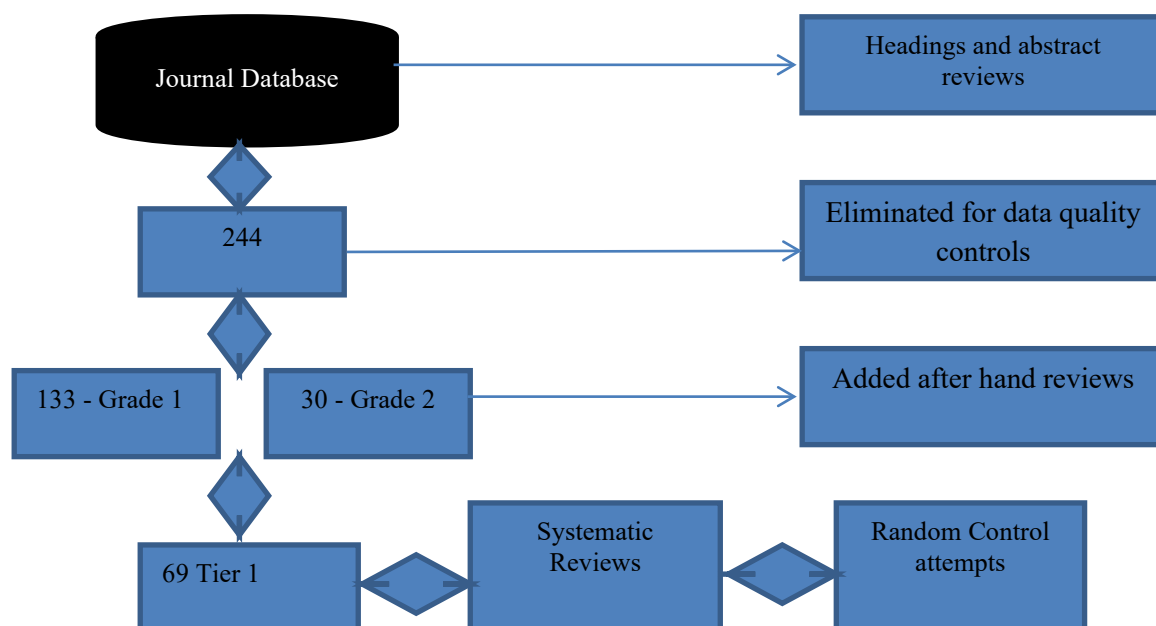


Fig 1: Incorporation procedure for journals in the research type

An information extraction spreadsheet was structured following the framework provided in BEME (Best Evidence Medicinal Education) group segment and the conceptual framework that potentially identified all the necessary terms essential for the research of EPC. The classification decision has been essential in cases when the application of terminologies was unpredictable with EPC terminological definitions [2]. For instance, a journal that evaluated distant learning as an approach that used the PC

system as a basic framework for the delivery of interactive education. This mode of learning is based on the internet and cloud system which has been coded and classified as interactive approach delivered through computers considered as a medium of instruction. Fig 2 below shows the illustration of the classified terminology indicated in a panel (A, B and C) to showcase the manner in which terminologies are utilized to organize and classify articles for the purpose of research evaluation.

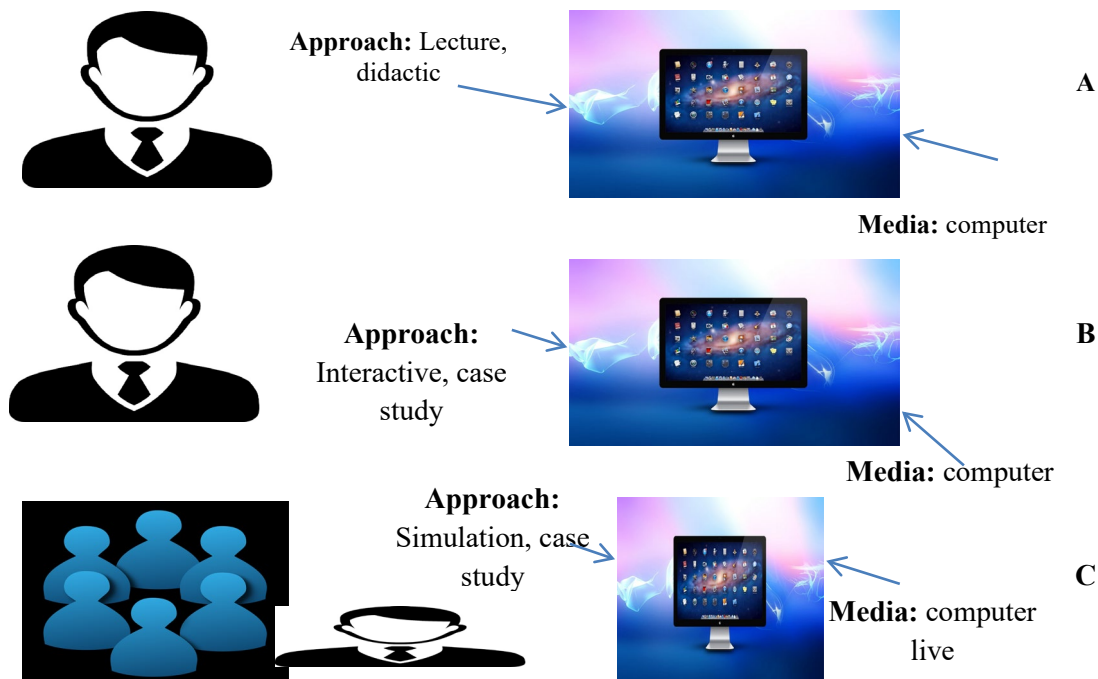


Fig 2: Indication of classification terminology in the A, B and C panel

2.1 Findings

The chosen journals that effectively showcase the common outcomes and findings of CPE are illustrated in the findings and discussion sections [3]. The fundamental data retrieved from the scholastic psychology literature is cited in this research.

2.2 Approaches

The approaches signify the education approaches utilized in the instructions. The approach illustrations are centered on the CPE terminological definitions which reflect the technics defined in the journals evaluated.

3. Research Analysis and Review

3.1 Case-based

The process of learning utilizes the actual and created medical cases which present questions and materials. Irrespective of the fact that the case-centered learning system was not certainly compared to the other approaches in the reviewed literature, it was typically considered as an approach in the journals that considered the interactive approaches. The case-centered learning is also considered

as an approach utilized for the PC-delivered CPE courses. The researchers [4] did the comparison of the various forms of media used for the case-centered education and noticed positive educational results both with the application of the live standardized patients and the computer-centered virtual patients.

3.2 Lecture/Didactic

This analysis is based on the presentation knowledge content, data organization and pacing. Lectures are typically connected to the literature texts as an ancient instruction, didactic and lecture-centered training. The didactic researches are not identified to be fundamental educational approach compared to other fundamental approaches. Two researches on CPE have founded zero statistical variation in education outcomes and about three researches founded didactic to be somewhat effective compared to the other approaches. The researchers [5] did an analysis of didactic analysis with the process of simulation. The research was however limited by minimal sampling sizes ($n = 50$). However, this still showcased that the simulation segment has a fundamentally higher mean post-tested score (where p is less than 0.01) and general higher educational satisfaction. Different systematic

analysis which contrasted didactic analysis to a wide-range of training approaches also indicated instructions to be minimally effective training approach.

3.3 Responses

Responses are essential for the purposes of providing data to students based on performance. Many journals identified responses as fundamental as findings. The researchers [6] contrasted personalized responses in the manner of graphics (which defines a prescribed portrait) centered on the individual historical analysis of the drug-prescribing exercises. The researchers [7] did a systematic evaluation of simulation identified feedback and practice as a basis for fundamental skill enhancement. The review of CPE indicated the significance of responses and instructors' interaction with learners in enhancing educational results.

3.4 Games

Games, competitive with the pre-set protocols are utilized based on instructional technologies and have been addressed in a single rigorous systematic analysis. The researchers found limited researches that were considered minimal to moderate methodological value which potentially provided inconsistent findings. About three to five research findings illustrate that training games might possibly have positive influence on the enhancing clinical learners' skills which potentially allow for interaction and responses.

3.5 Interactive

This element allows learners and facilitators to interact with ease. The research articles have been used to compare the interactive CPE to other essential training approaches. The researchers [8] based on the research on novel interactive approaches to be fundamentally superior for skillset outcomes compared to didactic lectures. Two novel researches found the interactive approaches were significantly effective when responses from chart audits were included in the intervention. Three methodical reviews and a single meta-analysis specifically noted the significance of student engagement and interactivity in education for attaining positive academic results.

3.6 Point of Care (POC)

With this element, data is provided as required and is based on the point of medical care. Two literature reviews and a single systematic article categorically addressed POC as an approach. The systematic evaluation incorporated a number of three essential researches, whereas the results were not so strong as they incorporated POC amounted to enhanced confidence and knowledge. In the evaluation of media, researches illustrated that handheld devices were considered effective compared to the print-centered, POC supports even though outcome evaluations were individually-reported behaviors. Researches [9] found enhanced performance on a process among the surgical residents who obtained POC tracking through video media via smartphones contrasted to those who obtained the didactic guidelines only.

3.7 Problem-centred education

This element reviews and evaluates a specific case allocating data-seeking answers and tasks based on the case. The cases might be non-facilitated or facilitated. In this research, four articles certainly compared the problem-centered education to other forms of approaches. A single study identified the element and two other reviews showed it as a relatively equal element to didactic guideline. The systematic analysis of about 10 researches on problem-centered education reported the inconclusive proof which was meant to support the methodology. However, different researches reported an enhanced critical-thinking confidence and skills in the process of making quality decisions [10].

3.8 Reminders

This element is designed to provide timely reminders. In a research done in Kenya, it was found that using smartphones for repetitive reminders amounted to fundamental enhancement in medical providers' case processing and management of pediatric malaria illnesses. It was also noticed that these gains were retained basically for a period of six months. The projection-to-treat indicated that the correct processing and management approach enhanced about 23% immediately after the process of intervention has been completed. Reminders in this research have been considered as a fundamental approach by two of the identified systematic analyses [11].

3.9 Self-directed

This element is done independently by the students in relation to the education needs. The terminology 'self-directed' was challenging to extract for evaluation as a result to the widely diversified technology. Some researchers utilized the terminology 'distance learning' and others utilized it to illustrate the delivery medium instead of the approach. This research categorically defines literature reviews which were considered consistent with the definition of the individualized-directed education even though the authors utilized various terminologies [12]. A systematic research done recently identified that moderated qualified systematic evidence indicates a considerable increment in skill domain contrasted to the tradition form of education. However, it should be noted that this is as a result to the increased content exposure. One research found that modest enhancements in skillset were based on individual-directed technique. However, this was less-effective at affecting the readiness and attitude to transition. A lot of researches focused on the application of the PC system as a medium to communicate guidelines and identified that individual-directed guidelines were considered effective as teachers led interactive and didactic guidelines which were somewhat efficient [13].

Simulation incorporate virtual ecosystems, models, standardized patients, devices and clinical environments which have the capacity to simulate conditions, events and problems experienced in defined and professional encounters. The process of simulation was identified as an effective approach for enhancing the educational outcomes over the systematic analyses, certainly for the enhancement

of clinical and psychomotor decision-making competency. The systematic analyses all considered the weak and inclusive approach in the researches done, but identified effective proofs present to support the simulations as significant for communication and psychomotor skills enhancement to enhance the process of learning. The systematic evaluation by researchers indicate that patient simulators are anatomic or computer models is one of the fundamental simulation norms.

Results of the four various RCTs showed that the process of simulation was more effective compared to the approaches to which they were compared to. These include didactic and interactive approaches. An analysis by researchers [14] showed that even though skillset results were the same between the simulation and interactive groups, the simulation group performance in the delivery and labor drill was fundamentally higher for eclampsia and dystocia at one month after intervention. The process of simulation was also considered to be fundamental for identifying more educational gaps such as drills on obligations of sulfate magnesium for medical administration. A systematic analysis concentrated on the resuscitation education recognized simulation as a fundamental approach irrespective of setting and media utilized to deliver it.

4. Providing Group Interventions for the Healthcare Sector

There are a lot of articles on team-based intervention which have focused on the approach of availing education to co-workers participating in the educational teams. A single systematic analysis of about eight researches identified that there were inconclusive and limited evidence meant to support the team-centered training. Two various articles analyses on similar CPE evaluation never identifies any enhancement in knowledge and performance acquisition with the incorporation of utilizing the team-centered technique.

4.1 Frequency

This analysis incorporated the consideration of frequencies contrasting single frameworks versus the repetitive forms of exposure. Three reviews concentrated on the frequencies that support the application of repetitive intervention. All these research evaluations concentrated on the application of the spaced training platform which is presently known as Stream, a network-centered medium that utilizes repeated feedback and targeted feedbacks. The proof from these three various articles showed that repeated and time-based training exposures amounted to effective skillset outcomes, better medical decisions and better retention contrasted to single forms of intervention and live guidelines. The application of multiple and repetitive exposures is based on other systematic analyses of literature which also incorporates a single RCT done in Eastern Africa that utilized repeated reminders of texts and amounts to fundamental enhancement in coping up with malaria diagnosis and treatment guidelines.

4.2 Setting

The process of setting is based on the physical geographical location whereby the guidelines occur. We identified three fundamental articles which appeared certainly at the educational setting. The results concerning the settings are stemmed from a single form of intervention. An analysis done by researchers [15] categorically addressed the implication of technique and setting (team-centered education) on skillset acquisition and identified minimal significant variation in the scores centered on the settings.

The systematic analysis of approximately eight articles assessing the efficiency of the team-centered education for obstetric healthcare never found fundamental variations in educational outcomes between the medical setting and simulation center. In the same analysis, it was identified that classroom education enhanced the level of knowledge, but not typical skillset, behavior or attitude outcomes, whereby medically incorporated education enhanced all the potential results. This result was supported by the CPE's systematic analysis that suggested that training in the medical or simulation setting is efficient. A systematic analysis of more than twenty researches evaluated the stand-alone evaluation against medically incorporated training. This analysis indicated that medically incorporated training enhanced behavior, attitude and skills not just knowledge.

4.3 Media

The element of media represents the manner utilized to deliver the curriculum. The RCTs majority is contrasted to the individual-paced or personal instruction provided through the PC system versus group-centered and live guidelines.

4.4 Live against the PC-based

The live guidelines were considered to be somehow effective at enhancing the level of knowledge, but somehow transforming the medical practice conditions and behaviors. When contrasting live against the computer-centered instructions, a more frequent finding was that the PC-based instructions amounted to either similar or better knowledge performance of a variety of tests compared to live guidelines. Other researchers have found the computer-centered group which has been reported to outperform the teacher-centered group on the skillset post-test, where the participants spend less time finishing the education process compared to the participants available in the teacher-centered group.

The systematic evaluations indicate that the proof supports the usage of PC-delivered guidelines for attitudes and knowledge. Nonetheless, insufficient proof is present to support its usage in the process of changing the practice behaviors. A Cochrane systematic analysis identified about 16 random trials which analyzed the effectiveness of the network-centered training utilized to deliver CPE for the practical medical professionals. About six researches indicated a positive transition in members' knowledge and about three researches indicated a transition in the practical

comparison with ancient formats. A single systematic analysis indicated the significance of independent media and interactivity media in attaining its implications on medical practice behavior.

4.5 Mobile

There are a lot of literature sources which have evaluated the usage of animation over the audio guidelines in the cardiopulmonary resuscitation based on the application of smartphones. In the analysis, it was noted that groups had audio-visual animations which perform more effectively compared to the groups receiving live guidelines through their devices. Nonetheless, the groups were not capable of performing the psychomotor knowledge correction. It was founded that giving POC decision supports through mobile devices amounted to slightly effective individual-reporting on the result measure contrasted to the print-centered tasks. However, both the mobile and print groups indicated significant development in the usage of the evidence-centered decision-making framework.

4.6 Print

The systematic analysis of the print-centered materials done by researches never found enough proof that can support the usage of print media to transform medical practice behaviors. The contrasted usage of the print-centered protocols to live and the interactive workshop showed that the groups which went through the live guidelines were in a position to identify asthmatic patients with ease. Nonetheless, neither of the interventions amounted in the transformed behaviors connected to the diagnosis plans. Many systematic analyses caution over the usage of the print media application hence, drawing conclusions that live guidelines is categorically the prints alone. Other consistent themes were based on the support for the utility of multiple media in CPE interventions.

5. Findings

The results are the effects of the educational intervention. This literature analysis concentrates on the transitions in skills, medical decision-making process, psychomotor and attitude skills which also reflect on the practical medical outcomes and clinical behaviors. The weight of the proofs over the considered researches showed that CPE might effectively focus on the skillset results. However, different studies utilized weaker methodological analyses. Categorically, the computer-centered guidelines were found to be somewhat effective compared to the live guidelines meant to address the level of knowledge whereas multiple repetitive exposure amounts to effective skillset compared to a single form of exposure. Games might also add to the skillset if formulated as an interactive educational experience which stimulates higher form of clinical thinking based on the evaluation, synthesis and analysis of medical data.

No research findings or systematic analysis evaluated the attitudes entirely, but CPE since they include medical integration, feedback and simulations aids in the process of addressing attitudes. EPC group systematic analyses and evaluations of the short-term and long-term CPE effects on the medical practitioners analyzed more than 26 researches

to identify the best trends that support the usage of multiple and multimedia exposures meant to focus on the attitudes. Different systematic analyses concentrated certainly on skills, mentioning that there are weak but enough proof to recommend that psychomotor competencies might be projected with CPE intervention which incorporate practical feedback, medical integration and clinical simulation. Dosage responses or giving enough feedback and practice was noted as essential for knowledge-related results. Other RCTs indicate medically incorporated training meant to support the development of skills. Researchers have found that neither the audio training through animated nor mobile graphics amounts to the required psychomotor competencies hence reinforcing the necessity for feedback and practice for psychomotor knowledge development noted in other researches.

Two systematic analyses concentrated on information transfer skills and noted the approaches which incorporate behavioral modelling, feedback and practice, including long durations facilitating clinical opportunities. Proofs suggest that the enhancement of information transfer skills necessitating interactive approaches which incorporate the practice-based approaches and responses for supporting response strategies only. The results also indicate that multiple exposure PBL and simulation for CPE might enhance critical decision-making skills. The mobile-centered POC support was identified to be fundamental in the enhancement of critical decision-making compared to the print-centered task aids.

Different systematic analyses certainly evaluated CPE, practical behaviors and clinical proofs. These researches also found those interactive approaches which included interaction and feedback with the trainers. In the study, multiple exposures, multimedia and longer durations might affect the practical clinical behaviors. The targeted analysis of about 37 journals from EPC, analysis on the CPE implication on the medical practice has not yet drawn any potential conclusions. However, multiple exposures, multiple approaches and multimedia techniques have been recommended to enhance potential results. Feedback and interaction are found to be critical compared to the educational and print meetings. However, the print-centered unsolicited materials have not yet been identified to be so effective. The systematic analysis of the classroom-centered, live guidelines and multi-professional found that the implications on the medical results are limited.

6. Research Discussion

The research design heterogeneity incorporated in this analysis limits the assessment and interpretation that might be drawn. Nonetheless, there are considerable similarities between the data from the systematic reviews included in this paper and the similar evaluations that have been published in the training psychology literature analysis. We therefore believe that there are enough proofs to support the kind of efforts meant to evaluate and implement the combinations of educational media, settings, frequency and techniques incorporated in this research. Eliminating the educational approaches gives a passive twist of data such as readings, lectures and concentrating on the approaches

which engage the minds of students in mental analysis. For instance, case simulation, case studies and critical interactive approaches. This projection is significantly reinforced in training psychology literature. Till now, there is enough evidence to effectively endorse the usage of simulation as a recommended training technique which is considerable for communication, decision-making and psychomotor competencies. Providing the lack of proof for the didactic approaches, choosing interactive, efficient training approaches remains the fundamental element of consideration when formulating CPE interventions.

Individually-directed education was noticed to be an effective approach, but necessitates the usage of interactive approaches which critically engage the minds of learners. Individually-directed education has considerable advantages of permitting learners to research at their own speed, choose times effectively and tailoring the process of learning to suit their individualized needs. Limited evidences were found to effectively support the group-centered education and the issuing of training to the group members. There is the necessity for further research in this field, provided the value of properly engaging the minds of members available in a single location at the same time in what is known as in-service educational intervention. This result is certainly essential for the emergency competencies which necessitate the cooperation and collaboration of members.

Repeated exposure is also supported in research. Whenever possible, it is fundamental to replace even frequencies with repetitive and targeted learning which issue reinforcement of fundamental opportunities or messages to foster interactions. The recommendations retrieved from the training psychology analyses that focus on the cognitive overloaded issue indicates the targeted data which is repetitive and essential. Choose the settings in reference to the capacity to deliver fundamental training approaches which is the same as the work environments permitting for feedback and practice. In this moment of epidemic workplace education which minimizes absenteeism to support self-learning is fundamental. The summary from the research in training psychology reinforces the significance of incorporating learning to fundamentally make the experiences the same as that of the workplace.

Some common aspects emerged from the various articles evaluated the obligation of the media in CPE significance. Some systematic analyses show the application of CPE multimedia. It is significant to consider the researches which identifies the same skillset results between the live guidelines and computer-based guidelines that both use interactive approaches. These critically showcase the efficiency as a result of the approach instead of the media from which it was retrieved. Whereas the information on the application of smartphone technology to deliver CPE is considered limited, the research in this paper showed the potential implication of smartphone technology to enhance the providers' adherence to medical protocols. Presently, there is extraordinary access to standardized smartphone technology and enhancing the accessibility to cheap computers and tablets. The usage of

these devices to provide effective methodologies, warrants, evaluations and exploration in middle- and low-income nations.

CPE might significantly affect the required educational results in case effective approaches are utilized. There are very weak and limited information which directly connect CPE to enhanced medical practice results. Moreover, there is limited information which connects CPE to enhanced medical practice behaviors that might affect the strength of the linked results. The limitations analyzed in this research apply to the approach which we chose for this research. An integrative technique of the analysis was chosen due to most of the published researches of training and education available in both middle and low-resource nations. There are locations that never met the parameters necessary for most systematic reviews or meta-evaluations. The basic limitation of incorporated reviews is based on the preference from the non-scholastic data or unqualified reviews.

7. Conclusion and Future Research

In conclusion, the in-service education will remain a fundamental investment in maintaining and developing fundamental knowledge necessary for optimal global health in all international healthcare settings. Unfortunately, irrespective of the fundamental investments we have minor evidence on the efficiency of the approaches applicable in various nations irrespective of the resources. Nonetheless, the in-service education whenever delivered should be evidence centered. As discussed in the Bloom's systematic analysis didactic approaches and given published resources alone clustered in the range of minimal to no effectives. On the other hand, the interactive programs showcased moderate to higher beneficial results. Provided the present gaps in quality evidence from middle and low-income nations, future training research objectives have to incorporate well-structured evaluations that are affordable, effective and culturally effective. Connections of media, frequency, setting and techniques are structured for medical practitioners in both middle and low-income nations.

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