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Impact of evidence-based healthcare education for Chinese medicine practitioners: A pre-post evaluation

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ABSTRACT

WHO Traditional Medicine Strategy 2014-23 recommended evidence-based healthcare (EBHC) education for traditional and complementary medicine (T&CM) professionals, including Chinese medicine practitioners (CMPs). We evaluated the impact of a customized educational workshop on Hong Kong CMPs' knowledge, attitude and practice of EBHC.

Two validated instruments, Evidence-based Practice Questionnaire (EPQ) and Evidence-based Practice Inventory (EPI), were used to assess the impact of EBHC education. Paired t-tests were used to compare scores before and after the workshop. Multiple linear regression was performed to explore the associations between changes in EPQ/EPI scores and CMPs' characteristics.

CMPs who completed the workshop (n = 59) demonstrated significant improvements in the attitude (p = 0.013) and knowledge domains of the EPQ (p = 0.005). Significant improvements were also observed in the attitude, perceived behavioural control, decision making, and intention and behaviour domains of the EPI. CMPs who had never received prior EBHC training showed a larger magnitude of improvement in the EPI attitude (p = 0.032), decision making (p = 0.015), and intention and behaviour (p = 0.015) domains post-workshop.

Our findings suggest that tailored workshop is effective in strengthening knowledge and in improving attitudes towards EBHC. Future RCTs should be conducted to affirm our findings. Future initiatives may consider incorporating this education approach into CMP curricula, as well as facilitating implementation of EBHC in routine Chinese medicine practice.

1. Introduction

Evidence-based healthcare (EBHC) is defined as the integration of healthcare practitioners' clinical expertise and patients' values with the best available research evidence.[1,2] This concept is widely applied in biomedicine[3] and has become an important element among health profession curriculum.[4] However, there has been a slow uptake of EBHC education in the field of traditional and complementary medicine (T&CM).[5] To facilitate communication between biomedicine and T&CM, the World Health Organisation (WHO) Traditional Medicine Strategy 2014-23 recommended the incorporation of EBHC approach in the development of T&CM, including relevant educational initiatives.[5]

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Chinese medicine is one of the major forms of T&CM.[6] After the inclusion of traditional medicines in the upcoming International Statistical Classification of Diseases and Related Health Problems version 11 (ICD-11),[7] it is anticipated that the role of Chinese medicine will become increasingly important. While some Chinese medicine universities and hospitals in China have taken steps to implement the WHO recommendation of integrating EBHC concepts into Chinese medicine clinical practice and education,[8] there are certain obstacles to be removed. They include, but not limited to, direct use of clinical evidence without considering clinical expertise in Chinese medicine practice, or on the contrary, over-dependence on clinical experience and classical texts. Chinese medicine practitioners (CMPs) also lamented the lack of high-quality clinical evidence in their field of practice. [8–10]

In Hong Kong, the government has been advocating Chinese medicine development using a EBHC approach since the city's reunification with China.[11,12] Since 1998, full-time undergraduate programs on Chinese medicine have been launched in three local universities. Compulsory Continuing Medical Education (CME) program for all registered CMPs has also been implemented.[13] Nevertheless, the level of government funding allocated to Chinese medicine clinical research and education is relatively low when compared with other healthcare disciplines.[14] Consequently, there is a lack of EBHC training opportunities for both Chinese medicine undergraduates and CMPs despite government support and international trend.[15]

To address this educational gap, we developed an EBHC education workshop tailored for Chinese medicine practice, with a pedagogical goal fostering improvements in CMPs' knowledge, attitudes and practice towards EBHC. The aim of the current study was to evaluate the impact of this EBHC workshop on these aforementioned outcomes.

2. Methods

2.1. Study design

Non-randomised, pre-post intervention study.

2.2. Objectives

To evaluate changes in Hong Kong CMPs' knowledge, attitude and practice towards EBHC before and after attending an educational workshop tailored for Chinese medicine practice.

2.3. Participants

CMPs registered with the Chinese Medicine Council of Hong Kong[16] were eligible to participate. Participants were recruited via social media promotion, invitation emails sent to alumni of School of Chinese Medicine in three local universities, as well as flyers distributed in local Chinese medicine clinics.

2.4. Details of EBHC education workshop

Details of the EBHC workshop were reported in accordance to the Guideline for Reporting Evidence-based practice Educational interventions and Teaching (GREET).[17] An intensive EBHC workshop curriculum for CMPs was developed by a Chinese medicine practitioner and a methodologist (VC and IW) with expertise in EBHC. Content of the workshop (Fig. 1) was designed based on a national textbook "Foundations in Evidence-based Healthcare",[18] which is a recommended text among medical schools in China.

On top of the textbook content, the workshop design was tailored for Chinese medicine practice, based on the results from a previous qualitative study on Hong Kong CMPs' beliefs and attitudes towards EBHC. Course materials and readings provided were relevant to Chinese medicine practice. Open discussions on EBHC principles relevant to evidence-based Chinese medicine practice were specifically added as an interactive component, with an aim of clarifying concept misinterpretation. In-class exercises on risk of bias assessments of different types of clinical studies were also implemented, to offer participants with hands-on opportunity.

The objective of the workshop was to impart participants with knowledge and skills in clinical epidemiology, and to introduce the application of clinical evidence for informing practice.

The free 3-day (12 -h) face-to-face workshop was held in a lecture hall on University campus in August 2017. The workshop was primarily delivered by VC, who is an academic Chinese medicine practitioner, with more than 8 years of experience in clinical epidemiology, EBHC teaching and research. VC also supervised the in-class exercise, open discussion and provided feedbacks during the Q&A session. Electronic copies of course materials and lists of suggested readings were sent to participants via email prior to the workshop. Each participant received 12 CME points and a certificate of attendance upon completing the workshop. All teaching modules were video-taped, and were uploaded to a free, public access website[19] as learning resources. Participants were encouraged to revise the course materials online after the workshop, so as to fortify and consolidate their learning.

2.5. Outcome measures

CMPs' knowledge, attitudes and practice of EBHC, pre and post-workshop, were measured using two validated instruments: the Evidence-based Practice Questionnaire (EPQ)[20] and Evidence-based Practice Inventory (EPI).[21]

The EPQ is designed to assess health professionals' knowledge, practice and attitude towards EBHC.[20,22] The questionnaire contains 24 items (each item was scored on a scale of 1–7), which are divided into three constructs or subscales, namely practice of evidence-based practice (EBP) (6 items), attitudes towards EBP (4 items), and knowledge/ skills associated with EBP (14 items) (see Appendix 1 for details).[20] Each subscale score was generated by calculating the mean of item scores.[23] Higher scores in practice of EBP subscale, attitudes subscale and knowledge/ skills subscale indicating more frequent practice, more positive attitude and better knowledge towards EBHC respectively.[20] The EPQ has demonstrated good internal consistency, with Cronbach's alpha values of 0.87 for the total score, and over 0.70 for the three subscales.[20] Construct validity has also been established against an independent EBP measure, which suggested that there was a moderately positive relationship between the two scales.[20]

The EPI is designed to identify and evaluate barriers and facilitators of EBHC practice.[21] The instrument comprises of 26 items, which are divided into five dimensions: attitude (8 items), subjective norm (5 items), perceived behavioural control (6 items), decision making (3 items) and intention and behaviour (4 items) (please refer to Appendix 2 for details). Definitions of each EPI dimension are shown in Table 2. Responses to each item were assessed on a 6-point Likert scale. Dimension scores were calculated by summing the item scores,[21] with higher scores indicating a particular dimension being an enabler of EBHC practice and vice versa. Structural and construct validity of EPI have been established,[21] and it has also demonstrated excellent overall internal consistency with Cronbach's alpha value of 0.93.[21]

2.6. Ethics

Participants were informed of the purpose of the study, the confidentiality of their contribution, and that their participation was voluntary. Written informed consent was obtained before the collection of pre-workshop survey data, and all participants agreed to participate in the study. The study was approved by the Survey and Behavioural Research Ethics Committee, The Chinese University of Hong Kong, Hong Kong, 2016 (reference no.: 101-16).

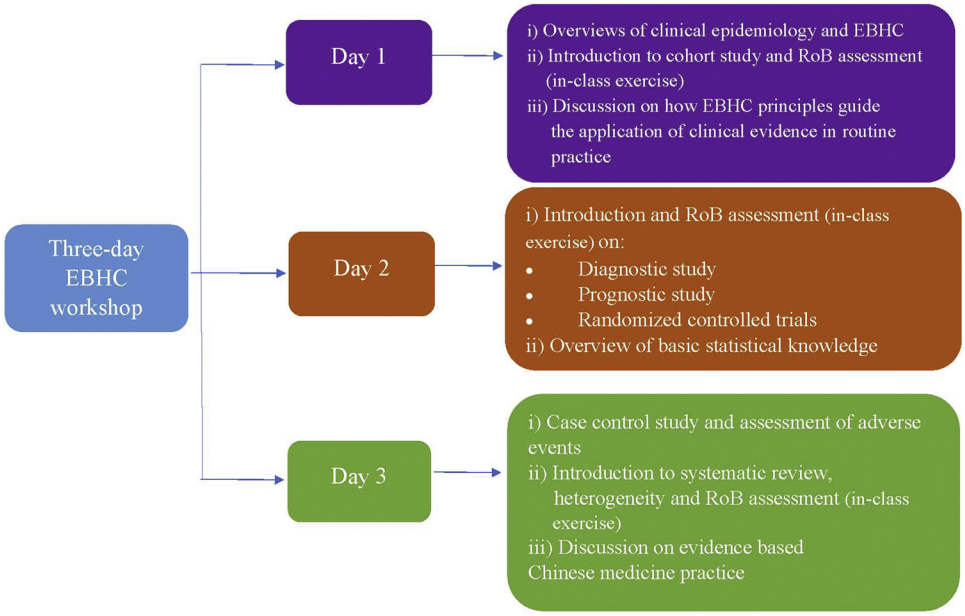

Fig. 1. Summary of the EBHC workshop.
Keys: EBHC, evidence-based healthcare; RoB, risk of bias; Q&A, questions and answers.

2.7. Data collection

Data were collected via an anonymous, self-administered online survey, which was implemented using Google Forms. To safeguard confidentiality, participants were not allowed to read summary and individual responses of other participants.[24] Besides, there was no missing data since participants had to fill in all required fields before submitting the form successfully.[25]

All participants received a confirmation email with a link to the pre-workshop assessment survey after registering for the workshop. The participants were asked to complete the first survey before attending Day 1 of the workshop, after providing written informed consent. At the end of the Day 3 workshop, participants received another email containing a link to the post-workshop assessment survey, and they were encouraged to complete this survey before they left the venue.

In the pre-workshop survey, we obtained data on sociodemographic and professional characteristics among participants, namely gender, age, Chinese medicine education background, years of practice, work setting and scope of practice. The scope of practice was divided into three main categories, consistent with the classification scheme prescribed by the Chinese Medicine Council of Hong Kong[16]: Chinese herbal medicine, acupuncture and bone setting. Both pre and post-workshop surveys comprised of the two instruments, EPQ[20] and EPI.[21]

2.8. Data analysis

Statistical analysis was performed using SPSS (version 22.0).[26] Categorical data were analyzed using proportions (%) while continuous data were analyzed using mean and standard deviation (SD). Mean differences in pre and post-workshop EPI and EPQ scores were assessed using paired t-tests.

Multiple linear regression was performed to explore the predictors of post-intervention EPQ and EPI scores. Independent variables included the pre-workshop EPQ and EPI subscale scores which were covariates and the sociodemographic and professional parameters. Dependent variables were the post-workshop EPQ and EPI subscale scores. Some of the sociodemographic and professional variables were dichotomised, including: female sex, no prior EBHC education, working in private Chinese medicine clinics, two major scope of practice: i) acupuncture and Chinese herbal medicine, and ii) acupuncture, Chinese herbal medicine and bone setting. Model assumptions were tested using diagnostic plots, including residuals versus fitted plot, normal Q-Q plot, scale-location plot and residuals versus leverage plot, to assess linear relationship, normality, homoscedasticity and outliers respectively.[27] Assumptions were found to be met by all post-workshop EPQ and EPI subscale scores. A p value of less than 0.05 was considered statistically significant at a 95% confidence interval.

3. Results

3.1. Sociodemographic and professional characteristics

A total of 115 Hong Kong CMPs commenced the first day of the EBHC workshop and 59 of them completed the 3-day workshop. The completion rate was 51.3%. Among these 59 CMPs, more than half (52.5%) of the participants were male, and the mean age was 40.5 years (Table 1). The majority of participants (72.8%) held a Master's degree or Doctoral degree qualification. Approximately one-quarter (25.4%) of participating CMPs had received prior EBHC training. Most (71.2%) had practiced Chinese medicine for less than 10 years, and 66.1% were currently working in private clinics. The main scope of practice among participants was Chinese herbal medicine and acupuncture (40.7%).

3.2. Practice, attitudes and knowledge of EBHC practice among CMPs

Significant improvements in attitude (mean differences (MD): 0.40, 95% confidence interval (CI):0.09 to 0.71, p = 0.013) and knowledge domain scores (MD: 0.43, 95% CI: 0.13 to 0.73, p = 0.005) of the EPQ were observed among CMPs who completed the workshop (n = 59, Table 2). There was no significant improvement in EPQ practice domain scores post-workshop (MD: 0.32, 95% CI: -0.02 to 0.66, p = 0.062). Item scores for each EPQ subscale are shown in Appendix 1.

3.3. Barriers and facilitators in practicing EBHC among CMPs

Participants demonstrated significant improvements in attitude (MD: 2.69, 95% CI: 0.96–4.43, p = 0.003), perceived behavioural control (MD: 1.92, 95% CI: 0.23–3.60, p = 0.026), decision making (MD: 0.86, 95% CI: 0.24–1.49, p = 0.007), and intention and behaviour dimension (MD: 1.00, 95% CI: 0.14–1.86, p = 0.024) scores of the EPI

Table 1
Sociodemographic data of participants who completed the 3-day EBHC workshop (n = 59).

Characteristics	Values
Demographics	
Gender, n (%) male	31 (52.5)
Mean age (SD)	40.5 (12.7)
Highest level of education achieved, n (%)	
• Bachelor' s degrees	12 (20.3)
• Master' s degrees	31 (52.5)
• Doctoral degrees	12 (20.3)
• Not applicable	4 (6.8)
Received prior EBHC training, n (%)	15 (25.4)
Employment	
Years of practice, n (%)	
• Less than 5 years	21 (35.6)
• 5 - 10 years	21 (35.6)
• 11 - 15 years	5 (8.5)
• 16 years or above	9 (15.3)
• Not applicable	3 (5.1)
Work setting, n (%)	
• Private clinics	39 (66.1)
• Non-private clinics	20 (33.9)
• NGO clinics	1 (1.7)
• Tripartite clinics*	10 (16.9)
• University clinics	1 (1.7)
• CM mobile clinics	1 (1.7)
• Others (incl. not applicable)	7 (11.9)
Scope of practice, n (%)	
• Chinese herbal medicine only	9 (15.3)
• Acupuncture only	1 (1.7)
• Bone setting only	1 (1.7)
• Chinese herbal medicine and acupuncture	24(40.7)
• Chinese herbal medicine and bone setting	2 (3.4)
• Chinese herbal medicine, acupuncture and bone setting	17 (28.8)
• Not applicable	5 (8.5)

Keys: SD, standard deviation; EBHC, evidence-based healthcare; NGO, non-governmental organization; CM, Chinese medicine.

* The management of tripartite clinics involve three parties: Hong Kong Hospital Authority, a University with a School of Chinese medicine, and a non-governmental organization.

post-workshop (Table 2). However, there was no significant improvement in EPI subjective norm domain scores (MD: 0.58, 95% CI: -0.46 to 1.61, p = 0.270). Item scores for each EPI dimension are shown in Appendix 2.

3.4. Relationship between participant characteristics and score changes

Multiple linear regression results indicated that CMPs who had not received previous EBHC training showed a larger magnitude of improvement in EPI attitude (p = 0.032) and decision making (p = 0.015) dimension scores post-workshop (Table 3). CMPs who were female (p = 0.016) and had not received prior EBHC training (p = 0.015) also showed a greater degree of improvement in EPI intention and behaviour domain scores after the workshop. No significant results were observed in the two remaining EPI post-workshop domains scores, perceived behavioural control and subjective norm (Table 3). Also, there was no significant relationship between CMPs' characteristics and practice, attitude and knowledge domain scores of the EPQ post-workshop (Appendix 3).

4. Discussion

Findings of our study indicate that teaching EBHC with tailored content on Chinese medicine practice can effectively improve CMPs' attitudes and knowledge on EBHC. These improvements include more positive attitudes, higher confidence on EBHC, more open to new information supporting change in clinical decision making, and increased intention in applying evidence to practice. Our results concur with a previous study, which demonstrated that EBHC education could improve attitudes and strengthen knowledge among CMPs.[28] We also showed that CMPs who receive EBHC training for the first time have shown greater improvement in attitude, decision making, and intention and behaviour domains. This implies that tailored EBHC education should be considered in the undergraduate Chinese medicine curricula.

However, it is noteworthy that our course is not successful in changing participants' subjective norm on EBHC, and this might be a major reason which hindered actual implementation of evidence-based practice. It is acknowledged that lack of support from managers and

Table 2
Results of Evidence-based practice questionnaire (EPQ) and Evidence-based practice inventory questionnaire (EPI) (N = 59).

EPQ [Based on 3 dimensions]	Baseline Mean score (SD)	Post workshop Mean score (SD)	Mean difference [Post workshop Mean score - mean score at baseline] (SD)	95% Confidence Intervals (CIs)	p values
Practice of evidence-based practice#	4.19 (1.18)	4.51 (1.24)	0.32 (1.29)	−0.02 to 0.66	0.062
Attitude towards evidence-based practice^	4.67 (1.13)	5.06 (1.05)	0.40 (1.20)	0.09 to 0.71	**0.013**
Knowledge/skills associated with evidence-based practice++	4.36 (1.12)	4.79 (1.11)	0.43 (1.14)	0.13 to 0.73	**0.005**

EPI [Based on 5 dimensions*]	Baseline Mean score (SD)	Post workshop Mean score (SD)	Mean difference [Post workshop Mean score - mean score at baseline] (SD)	95% Confidence Intervals (CIs)	p values
Attitude	33.2 (8.11)	35.9 (6.49)	2.69 (6.66)	0.96 to 4.43	**0.003**
Subjective norm	18.2 (5.20)	18.8 (4.88)	0.58 (3.97)	−0.46 to 1.61	0.270
Perceived behavioural control	24.8 (6.26)	26.8 (5.50)	1.92 (6.45)	0.23 to 3.60	**0.026**
Decision making	12.2 (2.54)	13.0 (2.83)	0.86 (2.38)	0.24 to 1.49	**0.007**
Intention and behavior	16.3 (3.78)	17.3 (3.74)	1.00 (3.31)	0.14 to 1.86	**0.024**

Definitions of EPI dimensions:
Attitude: A clinician's individual evaluation of evidence-based practice; Subjective norm: A clinician's own estimate of the social pressure to perform or not to perform evidence-based practice behaviour; Perceived behavioural control: The extent to which a clinician feels able to enact evidence-based practice behaviour; Decision making: The extent to which new information reshapes the clinician's current understanding and habitual behaviour; Intention and behaviour: The clinician's aim and actual response, respectively, to apply evidence-based practice.
Keys: SD, standard deviation.
Definitions and interpretation of EPQ dimensions:
^ All items in this dimension were scored on a scale of 1–7, ranging from negative to positive. Higher score indicates more positive attitude towards EBHC.
# All items in this dimension were scored on a scale of 1–7, ranging from never to frequently. Higher score indicates more frequent practice of evidence-based healthcare (EBHC).
++ All items in this dimension were scored on a scale of 1–7, ranging from poor to best. Higher score indicates better knowledge on EBHC.
* Each dimension scores were calculated by summing up the item scores within the dimension. Higher scores indicated more positive inclination.

Table 3
Association between EPI domain scores and participant characteristics: Multiple linear regression analyses (n = 50).

EPI Attitude domain score	Unstandardized coefficients	95% Confidence Intervals		p values
	B*	Lower bound	Upper bound	
	16.315	4.786	27.845	0.007
Gender^	0.321	−3.132	3.773	0.852
Age+	−0.066	−0.227	0.096	0.416
Highest education level achieved^	0.369	−2.294	3.031	0.781
Received prior EBHC training^	3.988	0.355	7.621	**0.032**
Years of practice^	0.513	−1.675	2.701	0.638
Work setting^	−0.191	−3.707	3.325	0.913
Area of practice [CHM plus ACU]^	−3.096	−7.318	1.126	0.146
Area of practice [CHM, ACU and bone setting]^	−1.808	−6.505	2.889	0.441
EPI Attitude domain score at baseline+	0.594	0.373	0.816	**< 0.001**

EPI Decision making domain score	Unstandardized coefficients	95% Confidence Intervals		p values
	B*	Lower bound	Upper bound	
	3.896	−1.217	9.009	0.131
Gender^	−0.223	−1.646	1.200	0.753
Age+	−0.031	−0.096	0.034	0.334
Highest education level achieved^	0.404	−0.665	1.473	0.450
Received prior EBHC training^	1.900	0.393	3.406	**0.015**
Years of practice^	0.224	−0.654	1.103	0.609
Work setting^	−0.078	−1.468	1.312	0.910
Area of practice [CHM plus ACU]^	−0.405	−2.103	1.293	0.632
Area of practice [CHM, ACU and bone setting]^	0.796	−1.074	2.665	0.395
EPI Decision making domain score at baseline+	0.685	0.408	0.963	**< 0.001**

EPI Intention and behaviour domain score	Unstandardized coefficients	95% Confidence Intervals		p values
	B*	Lower bound	Upper bound	
	0.710	−6.329	7.750	0.839
Gender^	2.316	0.452	4.180	**0.016**
Age+	0.041	−0.043	0.125	0.328
Highest education level achieved^	0.361	−0.992	1.714	0.593
Received prior EBHC training^	2.375	0.482	4.269	**0.015**
Years of practice^	−0.264	−1.404	0.876	0.642
Work setting^	0.033	−1.766	1.832	0.971
Area of practice [CHM plus ACU]^	−0.847	−3.004	1.310	0.432
Area of practice [CHM, ACU and bone setting]^	1.246	−1.101	3.593	0.290
EPI Intention and Behaviour domain score at baseline+	0.775	−1.101	3.593	**< 0.001**

EPI Subjective norm domain score	Unstandardized coefficients	95% Confidence Intervals		p values
	B*	Lower bound	Upper bound	
	5.386	−2.063	12.834	0.152
Gender^	1.778	−0.651	4.208	0.147
Age+	−0.083	−0.191	0.025	0.129
Highest education level achieved^	1.130	−0.639	2.899	0.204
Received prior EBHC training^	2.475	−0.018	4.967	0.052
Years of practice^	0.713	−0.758	2.184	0.333
Work setting^	−0.053	−2.388	2.282	0.964
Area of practice [CHM plus ACU]^	−2.593	−5.460	0.275	0.075
Area of practice [CHM, ACU and bone setting]^	−1.026	−4.171	2.119	0.513
EPI Subjective norm domain score at baseline+	0.733	0.490	0.977	**< 0.001**

EPI Perceived behavioural control domain score	Unstandardized coefficients	95% Confidence Intervals		p values
	B*	Lower bound	Upper bound	
	16.471	6.419	26.524	**0.002**
Gender^	−0.021	−3.105	0.748	0.989
Age+	−0.067	−0.210	3.064	0.348
Highest education level achieved^	0.991	−1.353	0.076	0.398
Received prior EBHC training^	3.289	−0.027	3.335	0.052
Years of practice^	0.255	−1.697	6.606	0.793
Work setting^	−0.619	−3.706	2.207	0.687
Area of practice [CHM plus ACU]^	−3.425	−7.254	2.468	0.078
Area of practice [CHM, ACU and bone setting]^	−0.924	−5.135	0.404	0.660
EPI Perceived behavioural control domain score at baseline+	0.482	0.215	3.287	**0.001**

Keys: CMPs, Chinese medicine practitioners; EPI, Evidence-based practice inventory questionnaire; CHM, Chinese herbal medicine; ACU, acupuncture.
^Coding of categorical independent variables: Gender (0: Male, 1: Female); Highest education level achieved (0: Bachelor' s degrees, 1: Master's degrees, 2: Doctoral degrees); Received prior EBHC training (0: Yes, 1: No); Years of practice (1: less than 5 years, 2: 5–10 years, 3: 11–15 years, 4: 16 years or above); Work setting (0: non-private, 1: private); Area of practice [CHM plus ACU] (0: No, 1: Yes); Area of practice [CHM, ACU and bone setting] (0: No, 1: Yes).
* Multiple linear regression under Enter Method: all independent variables are entered into the equation simultaneously.
+ Continuous independent variables.

colleagues might inhibit the implementation of evidence in healthcare settings.[29,30] To address this barrier, a potential solution is to create a supportive environment, a positive organizational culture towards EBHC, as well as education and multidisciplinary cooperation.[29,30] These strategies are found to be effective in encouraging the exchange of new information among colleagues,[30] but how this will change the norm towards EBHC among CMP would require piloting and evaluation.

In line with existing evidence,[31] our results show that a 12-h workshop alone is insufficient for promoting the application of EBHC approach in Chinese medicine practice. To promote uptake of EBHC practice, a three-step study could be conducted for investigating implementation issues among CMPs. Firstly, contextual barriers and enablers to adopting EBHC practice could be identified from a behavioural perspective. This can be explored through qualitative studies guided by the Theoretical Domains Framework.[32] Then, theory-based implementation interventions plan could be tailored according to the Hong Kong context, with reference to established catalogue of strategies like the behavioural change wheel.[33] Lastly, the preliminary implementation interventions developed in the last step could be finalized using Delphi expert consensus, so as to enhance stakeholder acceptability.[34] This implementation strategy formulation approach may guide policy makers and managers in enhancing local Chinese medicine development in an evidence-based manner.

While implementation science may offer solutions, the applicability of current clinical evidence in Chinese medicine requires reconsideration.[35] Such reservation is associated with practitioners' negative perception on clinical research, as well as the incompatibility of clinical research methodology and diagnostic tradition of T&CM.[35] Negative perception on clinical research may originate from the fact that, in Chinese medicine, majority of systematic reviews has substantial methodological flaws, as well as limitations on external validity.[36,37] To improve trustworthiness, in the future systematic reviewers should strictly adhere to the relevant methodological and reporting guidelines when conducting systematic reviews.[38,39]

To address the deeper barrier of epistemological differences, it is necessary to build a research culture in Chinese medicine community, to increase funding on Chinese medicine-related research[40] and to improve collaboration between researchers and CMPs[35] in innovating novel research methodology that incorporate Chinese medicine theories into clinical study design.[41] For instance, consensus on tailored treatment strategies which correspond to specific Chinese medicine diagnoses can be established among Chinese medicine experts using Delphi method, and this complex strategy can be evaluated using RCTs.[41] Pragmatism should also be considered in the study design as it is more suited for evaluating the effectiveness of complex interventions.[42] However, since the addition of Chinese medicine diagnostic result in clinicals trials remained to be challenging, methodological limitation in the current evidence base will remain as a key barrier to CMPs' EBHC practice.[43]

There are several strengths and limitations in this study. Two validated instruments, EPQ[20] and EPI,[21] were used to assess CMPs' knowledge, attitudes and practice of EBHC before and after workshop. There was no missing data on the outcome assessment among CMPs who completed the 3-day workshop.

The non-completion rate of the 3-day training was not small, and this is one of the limitations of our study. The non-completion rate of the workshop was close to 50%. This may be due to participants' a lack of time to attend the 3-day face-to-face workshop as they may have other priorities.[44] Online education is suggested to address such limitation by offering the flexibility of time and place.[45] As all teaching modules in our study were video-taped and uploaded to the public access website as learning resources,[19] future evaluation on changes in CMPs' knowledge, attitude and practice towards EBHC before and after attending the online education tailored for Chinese medicine practice may be conducted. We may also compare the completion rate and impact of the training between the face-to-face workshop and online education among CMPs using a RCT design. Results will be useful in informing future delivery design of EBHC education within CMP curricula.

Although our results are generated from a small number of participants, it is acknowledged that a limited class size could facilitate stronger interactions and deeper learning.[46] Since there was no control group in our study, this methodological limitation has only allowed us to formulate preliminary conclusion. Future RCTs should be conducted to confirm our current findings. As it can take some time for CMPs to understand EBHC thoroughly, and in turn modify their practice behaviour,[47] the short time-frame of this study may not be sufficient to detect subsequent behavioural change in clinical practice. Thus, the longer-term impact of EBHC education (e.g. 1-year follow-up)[48] should be a focus of future research.

In conclusion, tailored EBHC education is found to be effective in improving CMPs' attitudes and knowledge, but not their subjective norm towards, nor practice of EBHC. Future RCTs should be conducted to affirm our findings. Further research may focus on developing a tailored implementation strategy beyond education for promoting the adoption of EBHC practice in Chinese medicine, as well as in innovating clinical research methodology which balance rigor and tradition.

Authorship contributions

Study concept and design: CHLW and VCHC. Acquisition of data: CHLW and WKWC. Interpretation of data: CHLW and IXYW. Fig. 1 preparation: CHLW. Tables 1–3 preparation: CHLW. Appendix 1–3 preparation: CHLW. Drafting of the manuscript: CHLW. Critical revision of the manuscript for important intellectual content: IXYW, MJL, WP, YZ, JCYW and VCHC. Administrative, technical, or material support: RSTH. All authors reviewed the manuscript, agreed to all the contents and agreed the submission.

Competing interests statement

We declare no competing interests.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.ctim.2019.05.004.

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