

# Development and implementation of a web-based continuing professional development (CPD) programme on medical genetics

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## Summary

We developed, implemented and evaluated a web-based continuing professional development (CPD) programme on medical genetics. Development of the CPD programme followed the ADDIE model, i.e. Analysis, Design, Develop, Implement and Evaluation. An invitation to participate in a needs analysis survey was sent to all doctors on the email list of the Sri Lanka Medical Association. A total of 129 completed surveys was received (57% of the 228 who accessed the online survey). The average age of respondents was 42 years (range 27–81). The male: female ratio was approximately 2:1. Almost all respondents (96%) selected web-based CPD programmes, or web-based and conventional lectures, as their preferred method of learning. The programme was piloted on a group of 10 doctors. The average pre-knowledge score was 40.3 and the post-knowledge score was 62.1 marks out of 100 ( $P = 0.002$ ). We conclude that a web-based CPD programme on medical genetics is feasible in Sri Lanka.

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## Introduction

Continuing professional development (CPD) in medicine refers to the education of physicians after their formal training period has been completed. The aim is to provide better quality health care by keeping the physicians' practice up to-date. Studies have demonstrated that there is no single correct way of doing CPD.<sup>1</sup> There is a subtle difference between CPD and Continuing Medical Education (CME). The latter involves updating only clinical knowledge, whereas the CPD aims to develop and improve a broad range of skills necessary for medical practice.<sup>2</sup> Thus, CPD incorporates the concept of CME as well as clinical professional and managerial aspects.<sup>3</sup>

Historically, physicians have maintained their competence, and probably practised medicine better at the end of their careers than at the start, through an innate process of reflective learning and self directed learning.<sup>4</sup> However, the amount of biomedical knowledge doubles every 20 years,<sup>3</sup> and a doctor's practice could become rapidly outdated without activities that allow knowledge and skills to be updated. Thus there is a global trend to introduce CPD in medicine.

In Sri Lanka, the Sri Lanka Medical Association (SLMA) is the national professional medical association and has approximately 3000 members. The SLMA has taken steps to introduce CPD courses/programmes to

Sri Lankan doctors, such as setting up the National Centre for CPD in Medicine.<sup>5</sup>

## CPD programmes

The standard format of CPD for many years has been formal study courses, conferences, symposiums or workshops. Due to difficulties such as finances, time, job demands and work-life balance, CPD programmes are not accessible to those who live away from the main cities.<sup>1</sup> The introduction of e-learning has made CPD programmes easily accessible, even to doctors from rural areas.

The first online CPD course in the world was offered in 1996.<sup>6</sup> In the past few years, CPD on the Internet has

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grown steadily.<sup>1</sup> Some studies report that web-based learning is an attractive methodology for medical education and that it offers certain advantages over traditional methods.<sup>7</sup> Specifically, online CPD courses represent a cost effective, convenient option and one that affords physicians much flexibility when fulfilling educational requirements.<sup>8</sup> Research has shown that professionals are satisfied with the flexibility and convenience offered in web-based distant education and it is an effective and efficient mode of CPD delivery, especially for technologically competent professionals.<sup>9</sup>

## Genetics

Knowledge of genetics is essential for health professionals. At least 1 in 10 patients in primary care have a genetic component to their complaint.<sup>10</sup> It has long been recognised that health professionals' knowledge of genetics is limited.<sup>11</sup> Moreover, lack of knowledge and skills on genetics had lowered the confidence of doctors in handling patient queries on genetic information.<sup>10</sup>

Research has shown that more than 95% of physicians are interested in accessing medical genetic programmes via the Internet, especially if available free of charge.<sup>12</sup> The Internet has been identified as a promising medium for providing genetics education.<sup>13</sup> The objective of the present study was to develop, implement and evaluate a web-based CPD programme on medical genetics.

## Methods

The ADDIE model<sup>14,15</sup> represents a systematic approach to instructional systems development. It encompasses five phases: analysis, design, development, implementation and evaluation. Development of the CPD programme followed the ADDIE model:

1. *Analysis.* The process of needs analysis for CPD in medical genetics was done using a self administered, anonymous online questionnaire delivered through open source software (Lime Survey). Emails were sent to all SLMA members inviting them to respond to the survey and giving a link to the online questionnaire.
2. *Design.* Design and development of content, and identifying teaching/learning and assessment methods to evaluate the respondents at the end of the course was done using a blueprinting mechanism. The blueprint is a table that highlights exit outcomes and course content. It ensures the alignment between outcome, content and assessment.
3. *Development.* Content from genetic educational material was converted to the online mode of delivery using a theoretical model based on the Kolb and Lewin learning cycle<sup>16</sup> with the help of a content specialist and a medical educational specialist. The e-learning management system, mLearning, developed by Sri Lanka Telecom was used. It was customized according to the blue print.

4. *Implementation.* The CPD programme was implemented for a group of doctors. An invitation email was sent to some of the postgraduate trainees on the SLMA email list inviting them to participate in the pilot programme.
5. *Evaluation.* The programme was evaluated after implementation at level I (reaction) and level II (learning) of Kirkpatrick's evaluation hierarchy.<sup>17</sup> The first level evaluation was done using quantitative and qualitative feedback and the second level knowledge assessment was done using a set of 20 multiple-choice questions on pre-/post-knowledge assessment.

## Results

The online survey form was accessed 228 times. A total of 129 completed surveys was received, i.e. if each access was by a different person, then the response rate was 57%. The average age of the respondents was 42 years (range 27–81), see Figure 1. The majority (66%) were males. The majority (96%) preferred some kind of web-based form of CPD delivery (Table 1).

About 40% of respondents worked less than 10 km away from the SLMA headquarters where many face to face CPD activities take place (Table 2). There was no significant difference between the respondents' distance from the SLMA and their preference for web-based CPD (web-based or hybrid methods).

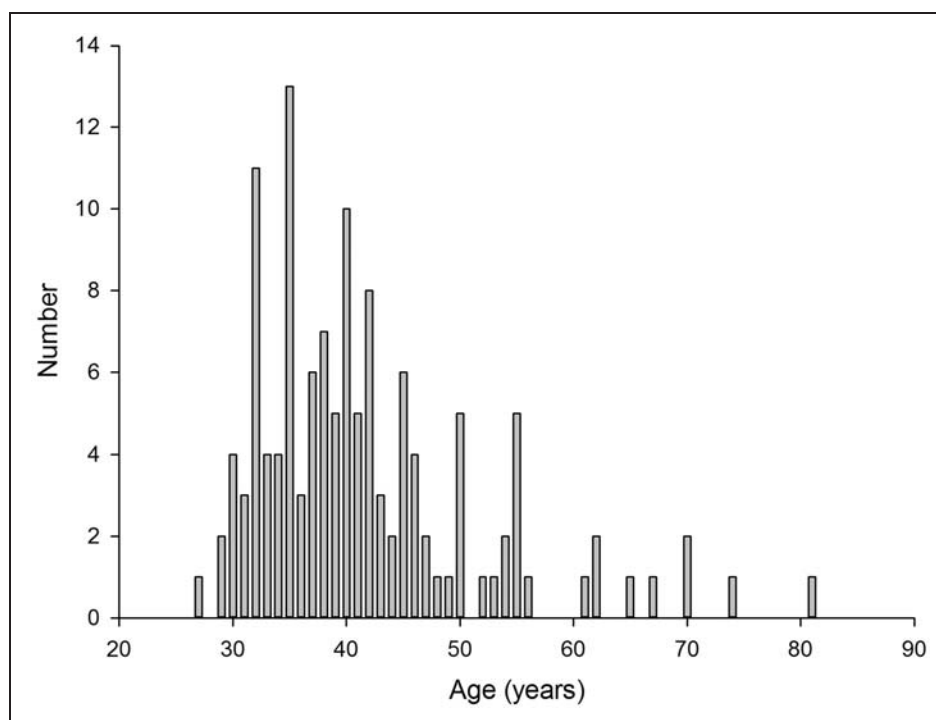
Most respondents (58%) were responsible for clinical care (Table 3) and had received postgraduate training following their first degree (72%) (Table 4). There was no significant difference between respondents who had postgraduate qualifications and those who did not with regard to the preference for web-based CPD.

Most respondents (84%) preferred to access a web-based CPD programme via a laptop computer (Table 5). Almost all (93%) had their own computer. Almost all computers at home or work were connected to the Internet. About half of the respondents (58%) had not previously followed any online courses.

Respondents' positive and negative opinion on the importance of an online CPD programme in genetics was divided almost equally (49.6% vs 50.4%). About one-third of the respondents (37%) wanted medicine and its sub specialities as the preferred subject areas in the future CPD programmes apart from/instead of genetics (Table 6).

## Evaluation of the CPD programme

The pilot course was followed by ten doctors who volunteered to participate in response to an invitation email. The first level evaluation was done using quantitative and qualitative feedback about course satisfaction and efficacy. The feedback ratings suggested that the respondents' satisfaction with the web-based CPD programme was average: 78% stated that the quality of the



**Figure 1.** Age distribution of respondents (n = 129).

**Table 1.** Preferred mode of delivery of CPD programmes.

	Number	Percentage
Conventional lectures only	3	2
Web-based online methods	47	36
Mixture of the above two methods	77	60
Other	2	2
<i>Total</i>	<i>129</i>	<i>100</i>

**Table 2.** Distance from respondents' workplace to the SLMA.

	Number	Percentage
less than 10 km	51	40
10-30 km	21	16
30-50 km	7	5
60-100 km	11	9
more than 100 km in Sri Lanka	30	23
in a foreign country	9	7
<i>Total</i>	<i>129</i>	<i>100</i>

programme presentation was average or better and 56% thought that the programme was useful in improving a doctor's clinical practice (Table 7).

The second level of evaluation was knowledge assessment, which was done by using multiple choice questions

**Table 3.** Main areas of responsibility (n = 129). Responders could have more than one area of responsibility.

	Number	Percentage
Clinical care	75	58
Laboratory medicine	14	11
Public health	38	30
Administration and related fields	24	19
Education	33	26
Research	23	18

**Table 4.** Highest level of professional education completed.

	Number	Percentage
MBBS/MD as first degree	36	28
Postgraduate certificate	9	7
Postgraduate diploma	24	19
MSc	21	16
MS/MD	37	29
PhD	2	2
<i>Total</i>	<i>129</i>	<i>100</i>

(MCQs). The average pre-knowledge score was 40.3 and the post-knowledge score was 62.1 marks out of 100 (Figure 2). A paired samples t-test indicated a significant increase in pre- to post-knowledge ( $P=0.002$ ).

## Discussion

The response rate in the initial needs assessment survey was 57%. This rate was higher than in a previous survey (41%) on satisfaction with web-based CPD.<sup>7</sup> However, the number of returns was low in comparison to those (n = 902) in an online survey on effectiveness of CPD.<sup>1</sup>

The respondents in our survey were middle aged. In comparison, a previous study reported an average age of 46 years.<sup>7</sup> Previous research has shown that the level of education is an important predictor of success in distance learning.<sup>7</sup> In our study, 72% of respondents had post-graduate medical qualifications. Web-based or hybrid

(conventional combined with online) professional development was perceived by 94% of the course respondents as the most suitable platform for learning. These results are similar to research demonstrating that 97% of respondents were satisfied with web-based courses<sup>7</sup> and not in agreement with other research which suggests that college conferences, medical society conferences and speciality association sessions were the most valuable contributors to CPD.<sup>2</sup>

The preference for web-based CPD found in our survey may be partly attributed to the high level of professional education of most respondents, their high interest in professional development despite their busy schedules and the fact that they were experienced Internet users. Most respondents (58%) were responsible for clinical care. Past studies report improved clinical practice as a result of e-learning and improved clinical decision making through the use of online group casework.<sup>18</sup> Therefore these respondents constitute a group that could benefit from e-learning. In the present study, the majority of respondents (60%) liked hybrid CPD programmes, which agrees with previous research demonstrating healthcare professionals' preference for a hybrid basic genetics course combining web-based learning with conventional face-to-face instructional techniques.<sup>19</sup>

About 50% of the respondents responded positively about the importance of an online CPD programme in genetics. In a previous study, a higher percentage of physicians (95%) were interested in accessing a genomic medical curriculum via the web.<sup>12</sup>

**Table 5.** Preferred modes of accessing a web-based CPD programme (129 respondents). Responders could state a preference for more than one mode to access.

	Number	Percentage
Desktop computer at work place	29	23
Desktop computer at home	37	29
Laptop computer	108	84
Mobile device	26	20

**Table 6.** Preferred subjects for CPD programmes (n = 129). Responders could prefer more than one subject area.

	Number	Percentage
Any new trend	17	13
Medical education	3	2
Public health	23	18
Forensic	1	0.8
Laboratory medicine and Radiology	3	2
Surgery, Ophthalmology, Anaesthesia	6	5
Gynaecology, Obstetrics	2	2
Paediatrics	4	3
General practice	8	6
General medicine and subspecialties	48	37

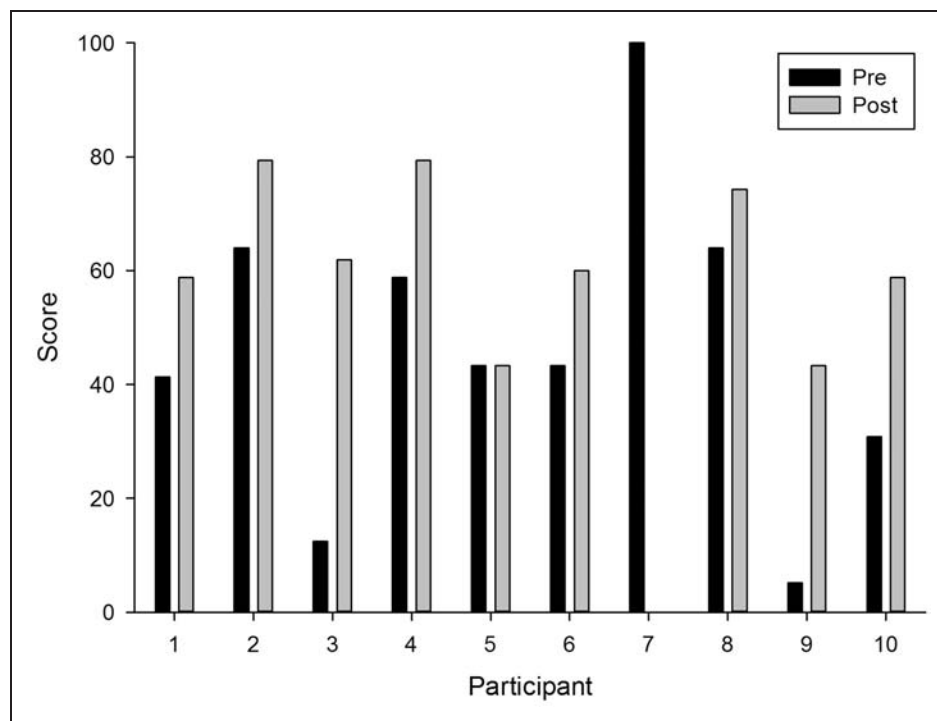
## Limitations of the study

The present study had several limitations, including the fact that sampling of doctors was non random and relied on self-reported, qualitative data. This does not allow generalization of the results to all health care professionals. Only ten doctors volunteered to participate in the pilot programme in response to an invitation email, which may be due to the busy schedule of doctors generally.

In conclusion, the results of this pilot study show that implementing a web-based CPD programme in medical genetics is feasible in Sri Lanka.

**Table 7.** Feedback from the respondents about the course satisfaction and efficacy (n = 9).

Question	Responses	Percentage
How would you rate the overall quality of the presentation of the programme?	Excellent/ Very good/ Average	78
How useful do you think this CPD programme on genetics will be in improving a doctors clinical practice?	Extremely useful/ Very useful/ Useful	56
How would you rate the overall quality of the presentation of the programme?	Excellent/ Very good/ Average	56
How easy did you find it to navigate and use this CPD programme?	Very easy to use/ Easy to use / Average in use	56



**Figure 2.** Pre and post test scores.

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