Clinical Effectiveness of Online Training in Palliative Care of Primary Care Physicians

Marta Pelayo-Alvarez, MD,¹ Santiago Perez-Hoyos, PhD,² and Yolanda Agra-Varela, PhD³

Abstract

Background: Primary care physicians (PCPs) have a major responsibility in the management of palliative patients. Online palliative care (PC) education has not been shown to have a clinical impact on patients that is equal or different to traditional training.

Objective: This study tested the clinical effectiveness of online PC education of physicians through impact on symptom control, quality of life (QOL), caregiver satisfaction, and knowledge-attitude of physicians at 18 months of the intervention.

Methods: We conducted a randomized clinical trial. Subjects were 169 physicians randomly assigned to receive the online model or traditional training. Consecutive patients with advanced cancer requiring PC were included. Physicians and patients completed the Palliative Care Outcome Scale (POS), and patients the Brief Pain Inventory (BPI) and the Rotterdam Symptom Checklist (RSCL) twice, 7 to 10 days apart. Caregivers completed the SERVQUAL. Physicians' level of knowledge-attitude was measured at 18 months.

Results: Sixty-seven physicians enrolled 117 patients. The intervention group had reduced scores for pain, symptoms, and family anxiety. The global RSCL scale showed a difference between groups. There was no significant difference in the questionnaires used. Caregiver satisfaction was comparable between groups. Physicians in the intervention group significantly increased their knowledge without any differences in attitude. Online training was completed by 86.6% in the intervention group, whereas 13.4% in the control group accessed traditional training.

Conclusions: Participation in an online PC education program by PCPs improved patient scores for some symptoms and family anxiety on the POS and also showed improved global QOL. Significant differences were found in physicians' knowledge at short and long term.

Introduction

GLOBALLY, THE PRIMARY CARE PHYSICIAN (PCP) has critical responsibility for patients' palliative care (PC). The Spanish NHS provides citizens access to universal care, and within it, the PC Strategy¹ stresses the critical role of PCPs and continuous training for professionals. Training needs of PCPs in PC have been described in the scientific literature, specifically for pain control and other frequent symptoms in patients with advanced cancer.^{2–5} Postgraduate education in PC in Spain is conducted mostly through traditional continuous training programs, although distance learning is being gradually introduced. E-learning offers advantages to students and is an alternative option to traditional education.⁶ The efficacy of online medical education is already quite well established in

knowledge acquisition, attitude, and learner satisfaction. However, studies assessing the clinical impact of online education^{7–10} have measured the professionals' perceptions, without clarifying their effects on symptom control and patient's quality of life (QOL).

The authors of this article have developed an online education model for PC targeted to PCPs in order to assess its clinical effectiveness. The primary objective of this study was to assess the impact of this training in symptom control on patients with advanced cancer. Secondary objectives included the assessment of patient's QOL, main caregiver satisfaction, PCPs' level of knowledge, and PCPs' attitude toward PC and satisfaction postintervention and at 18 months. The effect of the model on PCPs' level of knowledge, attitude, and satisfaction postintervention was described previously,¹¹ with

¹Primary Care NHS, Valencia, Spain.

²Methodology Support Unit for Biomedical Research, Research Institute of Vall Hebron Hospital, Barcelona, Spain.

³Directorate General of Public Health, Quality, and Innovation, Spanish Ministry of Health, Madrid, Spain.

Accepted May 14, 2013.

significant results in the intervention group in knowledge, confidence in symptom management, and confidence in communication with patients.

This article presents results for patients and caregivers, and effects on PCPs' knowledge and attitude at 18 months.

Methods

Participants and setting

The methodology for the first part of the study was published previously.¹¹ Briefly, the educational experience took place in Spain during 2009 and included 169 PCPs from all the 17 Spanish Health Regions (HR), who were randomly assigned to two groups. The intervention group ($n=85$) had access to the 96-hour online program for PC self-training, which 71 (86.6%) completed. The control group ($n=84$) could voluntarily receive a traditional PC training course (face to face, 20-hour duration course available at their HR), which 11 (13.4%) accessed.

Professionals' variables were collected, as well as were tests of knowledge and attitude toward PC (perception of confidence in symptom management and in communication) previous to the intervention (4 months, 18 months); and satisfaction with the teaching activity at 4 months. PC training outside the study was registered in both groups. After delivery of the intervention and during the following 18 months, PCPs consecutively enrolled patients with advanced cancer requiring PC, regardless of their life expectancy, who were able to read, write, and sign their informed consent. Patients with a Karnofsky Performance Scale score <20 not able to complete questionnaires and with cognitive impairment (>3 mistakes in the Pfeiffer score) were excluded. Patients were not aware of the group to which their PCP was assigned.

Patient variables collected by PCPs included age, gender, level of education, type of cancer, other diseases, previous treatments, presence of oncologic pain and for how long they were treated, Karnofsky score, and disease awareness (complete, partial, not aware).

Procedures

To assess the control of patients' symptoms, the Spanish versions of the Brief Pain Inventory (BPI)¹² and the Palliative Care Outcome Scale (POS)¹³ were used. The BPI is a multi-dimensional self-completion questionnaire that provides information about pain history, intensity, and quality. It includes 21 items, 11 of which are grouped into two scales: pain intensity (4 items) and pain impact (7 items), whereas the rest are individually analyzed. The measurement scale ranges from 0 (no pain/ does not interfere with daily life) to 10 (pain as bad as you can imagine/completely interferes with daily life). It is useful to assess pain changes every 3 to 7 days.¹² The POS consists of 10 questions, with a scale from 0 to 4 (0 = fewer symptoms, 4 = more symptoms), that assess control of pain and other symptoms. Each item is individually analyzed in order to provide a PC profile for the last 3 to 7 days. It is available in two versions, for physicians and patients (self-completion). In addition, patients are asked to list their main problems, and if they needed help to answer the questionnaire. The staff questionnaire includes the Eastern Cooperative Oncology Group (ECOG) performance status.

To assess QOL, the Spanish version of the Rotterdam Symptom Checklist (RSCL)¹⁴ was used. The RSCL includes 39

items referring to the last week divided into four scales (scores from 0 to 100): physical symptoms (23), psychological symptoms (7), daily life activities (8), and overall QOL (1). It provides a score for each scale and subscale (fatigue, pain, gastrointestinal, and chemotherapy). High scores represent a worse QOL, except for activity, which is interpreted the other way round. It can be self-completed, or completed by an interviewer. The chemotherapy subscale was not used in this study, as it was deemed useless for patients with no active treatment.

Caregiver satisfaction was assessed with the Spanish version of SERVQUAL¹⁵. It includes five dimensions on a scale from 1 (complete disagreement) to 5 (complete agreement): tangibles (7 items), reliability of treatments and care (5), assurance (9), responsiveness (10), and empathy (12). Caregiver variables included age, gender, level of education, relationship with the patient, employment status and changes due to patient care, availability of patient care help, who applied for home care (health care professionals, the caregiver), and sufficient number of visits by health care professionals (yes/no).

All the questionnaire scales were analyzed in accordance to SERVQUAL's measurement scale and in some instances the percentage of severe scores (3 or 4) in POS were presented to illustrate change in outcomes over time according to the recommendations made by the authors of the original version.¹⁶

When enrolling patients, the PCP completed the patient variables and the POS and then provided the patient with the POS (patient version), the BPI, and the RSCL for the patient to complete during the subsequent 3 days according to standard instructions received by PCPs. All questions about patient status referred to the previous week. After 7 to 10 days, the PCP completed the POS again, and provided the patient with the POS (patient version), the BPI, and the RSCL, as well as the SERVQUAL for the caregiver. Both sets of questionnaires (time 1 and time 2) were collected by the PCP and sent to the research team completing the follow-up of patients. Follow-up of physicians continued to 18 months when PCPs underwent a test of knowledge and attitude.

Statistical analyses

The sample size took into account a relevant clinical difference in the pain intensity scale of BPI of 20%, statistical power of 90%, alpha level of 0.05, questionnaire variability of 30%, and losses of 10%, resulting in 52 patients per group. The analysis included parametric and nonparametric tests, weighted Kappa for POS, Spearman correlation, and Cohen's effect size. Linear mixed effects multiple regression with multiple imputation for missing data¹⁷ was used to analyze questionnaire scores in both occasions. Bonferroni correction was used for multiple tests. Analysis was conducted using SPSS (version 18; SPSS Inc., Chicago, IL) and Stata (version 11.1; StataCorp., College Station, TX).

The ethics committee of the Hospital Ribera approved the study.

Results

Participant characteristics

One hundred and sixty-nine PCPs were included; 145 remained after dropouts, of which 67 enrolled 124 patients: 66 in the intervention group ($n=66$) and 58 in the control group

($n=58$). Of the 124 patients enrolled, 7 were excluded, leaving 117 patients for analysis (63 intervention and 54 control) (Fig. 1). Of the 78 PCPs who did not enroll any patients, 40 (24.4%) (16 intervention, 24 control) claimed that they did not have any patients meeting the inclusion criteria. Excluded physicians and dropouts did not enroll patients.

Baseline characteristics of physicians as to whether they enrolled patients or not were balanced.

Out of those 117 patients, 11 (5 intervention, 6 control) did not complete all the questionnaires, 10 due to death and 1 due to worsening of condition. All patients enrolled by the physicians were analyzed in their corresponding group.

At baseline (Table 1), control patients showed a higher prevalence of oncological pain (76% versus 60.3%), a longer time of treatment, and a lower prevention of constipation caused by opiates (20.4% versus 28.6%). Median time and standard deviation (SD) in days between the first and second completion of questionnaires was similar in both groups (11.7 [5.6] intervention versus 10.3 [4.2] control).

Patients' symptom control

The 10 isolated items in the BPI did not show any differences between or within groups. In the original data (Table 2),

median pain intensity in the intervention group at the first completion was 4.40, which was reduced by 0.22 at the second completion, with a difference of 0.13 between groups, and with an interaction effect or intensity change between groups and measurements of 0.28, nonsignificant. Findings were reproduced in imputed data, and equally for pain impact.

Major limitations on the ECOG scale were registered in 32% and 39% of intervention and control patients, respectively. The POS questionnaire was completed by patients themselves in 24% intervention versus 20.4% control, whereas 44.4% intervention versus 41% control needed help from a relative and 32% intervention versus 39% control required help from a health care professional. Severity scores in the POS were higher in the control group for: "level of pain" in the physician and the patient versions, "given information about illness" in the patient version, "share feelings with family" in the physician version, and "patient's feeling that his/her life is worthwhile" in the physician and patient POS versions. Kappa, Spearman correlation, and rate of agreement within a category were similar in both groups (Table 3). In terms of change of severity scores between both completions (Fig. 2), both groups reduced the pain score, and the intervention group also reduced the scores for symptoms and family anxiety, although these reductions were not significant.

FIG. 1. Physicians' and patients' participation flowchart.

TABLE 1. PATIENT CHARACTERISTICS

Characteristic	Intervention N=63 (%)	Control N=54 (%)
Gender		
Male	39 (62.0)	31 (57.4)
Female	24 (38.0)	23 (42.6)
Mean age, years (SD)	68.8 (11.4)	70 (11.7)
Education		
Literacy	21 (33.3)	21 (39.0)
Elementary school	26 (41.3)	18 (33.3)
Secondary education	7 (11.1)	8 (14.8)
Professional training	3 (4.8)	2 (4.0)
Undergraduate degree	2 (3.2)	4 (7.4)
High school diploma	4 (6.3)	1 (2.0)
Cancer type		
Digestive tract	22 (35.0)	15 (28.0)
Lung	15 (23.8)	14 (26.0)
Prostate	6 (9.5)	4 (7.4)
Larynx	4 (6.3)	3 (5.5)
Breast	2 (3.0)	3 (5.5)
Liver	2 (3.0)	3 (5.5)
Ovaries, vulva	3 (4.8)	5 (9.2)
Kidney	3 (4.8)	2 (3.7)
Leucemia, sarcoma	4 (6.3)	5 (9.2)
Melanoma	2 (3.0)	0
Radiotherapy	17 (27.0)	18 (33.3)
Chemotherapy	37 (58.7)	25 (46.3)
Other treatments	19 (30.0)	12 (22.0)
Karnofsky score = <50	35 (55.5)	32 (59.2)
Oncologic pain	38 (60.3)	41 (76.0)
Time of pain treatment in days, mean (SD), range	102 (119) 1–390	150 (286) 1–1345
Opiates	42 (66.7)	37 (68.5)
Sustained-release morphine	13 (20.6)	10 (18.5)
Short-acting morphine	8 (12.7)	9 (16.7)
Fentanyl patch	15 (23.8)	15 (27.8)
Short-acting fentanyl	5 (7.9)	4 (7.4)
Sustained-release oxycodone	2 (3.2)	2 (3.7)
Short-acting oxycodone	0	2 (3.7)
Hydromorphone	1 (1.6)	2 (3.7)
Buprenorphine	3 (4.8)	0
Tramadol	6 (9.5)	9 (16.7)
Constipation prevention in opiate treatment	18 (42.8)	11 (29.7)
Nonopioid analgesics (acetaminophen, metamizol, tricyclic antidepressants, NSAIDs, antiepileptics)	62 (98.5)	48 (88.7)
Diagnosis knowledge for patient		
Completely	35 (55.6)	25 (46.3)
Partially	23 (36.5)	25 (46.3)
No knowledge	5 (8.0)	4 (7.4)
Home care by physician	48 (76.2)	36 (66.7)
Palliative team visits	7 (11.1)	6 (11.1)
Diseases		
Cardiovascular	40 (63.5)	42 (77.8)
Diabetes and endocrines	24 (38.0)	30 (55.5)
COPD	11 (17.5)	12 (22.2)
Osteoarthritis	10 (16.0)	13 (24.0)
Gastrointestinal	4 (6.3)	6 (11.0)
Anxiety/depression	3 (5.0)	6 (11.0)
Ophthalmic	3 (5.0)	3 (5.5)

(continued)

TABLE 1. (CONTINUED)

Characteristic	Intervention N=63 (%)	Control N=54 (%)
Hepatic-renal	4 (6.3)	5 (9.2)
Prostate	7 (11.0)	6 (11.0)
Other	6 (9.5)	9 (16.7)
Other treatments		
Antisecretory drugs	29 (46.0)	24 (44.4)
Cardiovascular	22 (35.0)	14 (26.0)
Corticoids	18 (28.6)	18 (33.3)
Antianorexics	4 (6.3)	5 (9.2)
Bifosfonates	2 (3.0)	1 (1.8)
Antipsychotics	0	2 (3.7)
Other	9 (14.5)	15 (27.7)

COPD, chronic obstructive pulmonary disease; NSAIDs, nonsteroidal anti-inflammatory; SD, standard deviation.

No multivariate analysis was conducted for the BPI and the POS, due to lack of significant findings in univariate contrasts.

Patient's QOL

The RSCL global scale showed a higher and not significant difference between groups (interaction effect between time 2 and control group -4.2 [95% confidence interval (CI), -12.7 to 4.2], maximum score 100). Difference rates between groups and completions for original and imputed data were not significant: first completion: 0% in the psychological scale, 7.06% to 7.56% in the global scale; second completion: 0.82% to 0.65% in the psychological scale, 3.84% to 3.33% in the global scale.

Caregiver satisfaction. This item was measured in 48 (76.2%) intervention caregivers and 36 (66.7%) controls. Baseline characteristics were balanced in both groups, except for age: 59.8 (SD 11.7) intervention versus 53.2 (SD 17) control ($p=0.027$); and for home care requested by the caregiver: 12 (22%) intervention versus 18 (44%) control, or offered by the PCP: 34 (63%) intervention versus 21 (51%) control ($p=0.045$). The scores for the five questionnaire dimensions ranged from 3.2 to 4.2 (maximum score 5) without any significant differences between groups.

Given the balance in physician's baseline characteristics, no subgroup analysis was carried out of the impact on the intervention group of completing or not completing the online education or on the control group of receiving or not receiving traditional training in PC.

PCP knowledge and attitude at 18 months

For all PCPs (enrolling or no patients) 80% of questionnaires were received at 4 months. The knowledge test (maximum score 33) showed a positive difference of 5.2 (95% CI, 3.4–6.9) in the intervention group. At 18 months 40 (48.8%) and 44 (53.7%) questionnaires were available from intervention and control, respectively. The intervention group showed significant mean difference over the control group (3.6 [95% CI, 2.0–5.2]; $p=0.0001$), both for those who had received training outside the study (4.5 [95% CI, 2.7–6.2]; $p=0.0001$) and for those who had not (2.8 [95% CI, 0.5–5.2] $p=0.0018$). Confidence in patient symptom management and confidence in communication of diagnosis and disease prognosis showed

TABLE 2. GROUP COMPARISONS OF PAIN INTENSITY AND PAIN IMPACT OF THE BRIEF PAIN INVENTORY

Original data Imputed data	Value	95% CI	P	Difference with reference group
<i>Pain intensity</i>				
Time 1 in intervention (<i>reference</i>)	4.40 4.49	[3.87-4.93] [3.96-5.02]	—	0 0
Effect in time 2	-0.22 -0.24	[-0.59-0.15] [-0.65-0.17]	0.246 0.247	-0.22 -0.24
Effect in control	0.13 0.10	[-0.65-0.91] [-0.69-0.89]	0.740 0.808	0.13 0.14
Interaction between time 2 and control	0.28 0.28	[-0.27-0.83] [-0.39-0.96]	0.319 0.403	0.19 0.16
Difference between time 2 and time 1 in control	0.06 0.04	[-0.35; 0.47] [-0.50-0.59]	0.768 0.352	0.06 0.04
Difference of intervention and control in time 2	0.41 0.38	[-0.38-1.20] [-0.43-1.20]	0.307 0.356	0.41 0.38
<i>Pain impact</i>				
Time 1 in intervention (<i>reference</i>)	6.32 6.41	[5.56-7.07] [5.68-7.15]	—	0 0
Effect in time 2	-0.18 -0.49	[-0.67-0.30] [-1.04-0.07]	0.572 0.084	-0.18 -0.49
Effect in control	0.32 0.28	[-0.79-1.42] [-0.82-1.37]	0.460 0.617	0.32 0.28
Interaction between time 2 and control	0.23 0.46	[-0.49-0.94] [-0.34-1.26]	0.532 0.259	0.37 0.25
Difference between time 2 and time 1 in control	0.05 -0.03	[-0.48-0.56] [-0.71-0.66]	0.871 0.941	0.05 -0.03
Difference of intervention and control in time 2	0.55 0.38	[-0.58-1.67] [-0.36-1.84]	0.342 0.039	0.55 0.74

Brief Pain Inventory scale is 1 to 11.
CI, confidence interval.

TABLE 3. AGREEMENT BETWEEN PALLIATIVE OUTCOME SCALE SCORES FOR PATIENT AND STAFF ASSESSMENTS OVER TIME

Items: 1–9

Time 1 Time 2	Patient score (% severe) ^a	Staff score (% severe) ^a	Kappa weighted (95% CI)	Spearman correlation	Proportion agreement within 1 score
	Inter/Cont	Inter/Cont	Inter/Cont	Inter/Cont	Inter/Cont
Pain	28.6/33.3 18.4/23.3	19.0/29.6 16.5/19.3	0.5 (0.3, 0.7)/0.5 (0.4, 0.7) 0.5 (0.4, 0.7)/0.6 (0.4, 0.7)	0.6/0.7 0.6/0.7	85.6/85.6 87.9/87.9
Symptoms	19.0/5.6 6.7/6.7	3.2/3.7 5.4/5.6	0.4 (0.2, .05)/0.3 (0.2, 0.5) 0.3 (0.1, 0.5)/0.4 (0.2, 0.6)	0.6/0.5 0.3/0.5	82.8/80.2 82.2/84.4
Patient anxiety	36.5/35.2 34.9/40.0	32.1/33.3 32.7/42.2	0.4 (0.3, 0.6)/0.4 (0.2, 0.5) 0.5 (0.3, 0.7)/0.5 (0.3, 0.7)	0.6/0.5 0.6/0.7	82.9/82.9 84.9/84.4
Family anxiety	56.5/48.1 46.7/46.3	68.9/57.4 56.8/57.8	0.3 (0.1, 0.4)/0.3 (0.1, 0.4) 0.3 (0.2, 0.5)/0.4 (0.2, 0.6)	0.4/0.3 0.4/0.5	78.9/79.2 77.9/78.3
Given information	3.5/13.0 8.9/14.4	12.4/7.4 6.3/9.6	0.3 (0.1, 0.5)/0.4 (0.2, 0.6) 0.3 (0.1, 0.5)/0.5 (0.2, 0.7)	0.4/0.4 0.4/0.5	82.6/85.2 84.4/84.3
Share feelings	11.1/9.3 13.0/18.1	6.3/16.7 6.3/6.3	0.4 (0.2, 0.6)/0.3 (0.1, 0.5) 0.3 (0.2, 0.5)/0.3 (0.1, 0.5)	0.4/0.4 0.4/0.5	82.5/78.7 76.5/79.9
Life worthwhile	7.9/11.1 5.7/33.3	9.5/13.0 10.5/20.8	0.3 (0.1, 0.5)/0.3 (0.1, 0.5) 0.3 (0.2, 0.5)/0.6 (0.4, 0.8)	0.3/0.5 0.4/0.7	74.3/79.2 82.1/83.8
Feel good	11.1/13.0 10.5/23.3	11.1/15.0 10.2/18.5	0.3 (0.2, 0.5)/0.3 (0.2, 0.5) 0.4 (0.3, 0.6)/0.5 (0.3, 0.7)	0.5/0.5 0.5/0.6	81.7/81.8 84.3/84.2
Practical matters	35.6/27.4 33.6/32.6	30.8/29.6 26.0/23.3	0.4 (0.1, 0.6)/0.3 (0.1, 0.5) 0.5 (0.3, 0.7)/0.4 (0.2, 0.6)	0.5/0.3 0.6/0.4	73.7/70.1 79.7/78.5

^aScores rated severe (4 or 5).
CI, confidence interval.

FIG. 2. Percentage of Palliative Care Outcome Scale (POS) scores rated severe by patients and staff over time (95% confidence intervals). Group 1=intervention; Group 2=control. Time 1, Time 2=first, second questionnaires.

no differences between groups at 18 months. No other differences were detected between physicians who contributed patients and those who did not contribute patients.

Discussion

The positive outcomes of this study, in relation to the first objective, were an improvement in the intervention group in patient severity scores for symptoms and family anxiety on the POS and, in the global QOL scale on the RSCL in relation to the second objectives. No significant differences were evident between groups in the BPI scales of pain intensity and pain impact, in the POS, or in the RSCL.

PCP-patient consistency in the POS were low-medium in both groups, with higher consistency in pain, even though agreements within a score were high, similar to those found in other studies.^{13,16,18,19} Reported overestimation by PCPs of psychological symptoms and information provided, with underestimation of physical symptoms,²⁰ might have an impact on patient's management. However, lack of congruency as detected in this study in spite of PC training may improve with more PC training to help PCPs understand patients' symptoms.

Patients included were similar to those in other studies in percentage of cancer type, gender distribution, presence of oncologic pain, and treatments received.²¹ This fact showed a representative population. However, how physicians are organized to provide care could vary among countries. Questionnaires used to measure patient outcomes in PC have been less used in primary care, and even though rules for distribution of questionnaires were detailed in the study protocol, it is possible that there were differences among PCPs in distributing and collecting them from patients. However, the proportion of patient questionnaires with self-completion or requiring help was similar between groups. So the effect on the results of PCPs collecting the patient and caregiver questionnaires was in any case of little impact. Even though the number of patients included was not as expected in spite of the adequate number of physicians included, the difference of 0.10 scores found between groups in the pain intensity scale of the BPI was not clinically relevant, so the final sample size does not seem to have a direct effect upon outcomes. Between those physicians enrolling patients and those not enrolling patients, minimal baseline physician differences in previous training in PC and good

support by the PC team could have influenced the contribution of patients.

No differences were found in caregiver satisfaction. Caregiver satisfaction was medium-high in both of our groups in comparison with other studies,²² in which the best predictors of satisfaction were understanding the patient's situation, information of caregiver workload by professionals, and physician contact with patient and relatives.

Significant differences between groups were found in physicians' knowledge at short¹¹ and long term, and in confidence in symptom management and confidence in communication at short term but not at 18 months. There was no persuasion employed for the intervention group to take part in and complete the online training. Increased participation rates might be explained by the availability of the course and by the presence of tutors who could answer questions. The low participation in the traditional training in the control group could be explained by the type of course provided and increased difficulty accessing this training.⁶

A systematic review²³ has shown influential factors in the disparity between the number of clinicians involved in clinical trials and the number of patients they finally recruit. Incentives highlighted for recruiting patients were the involvement by support staff, loans for continuous training, and economic incentives. Our study offered teaching credits and financial incentives to PCPs recruiting patients.¹¹ Although the difficulty of conducting research in patients who require PC has been widely acknowledged, with losses up to 60%,²⁴ patients show a high tendency to take part in noninvasive studies, mainly focused on symptom control and QOL; they are willing to complete questionnaires, and are more likely to get involved if their physician and caregiver are also involved in the research.^{25,26}

The advantages of using online training over the traditional lecture format are: active learner involvement, flexibility, interaction and dissemination capabilities, learner satisfaction, and reduced cost. Teacher's training is similar to the traditional model.¹¹ Online postgraduate training in PC targeted to PCPs^{27,28} and other specialists^{29,30} has shown a positive effect in knowledge, attitude, perception of clinical change, and abilities. However, we have found no evidence of its impact on patients' symptom control and QOL with which to compare our outcomes. Our study showed evidence of e-learning impact on the improvement on patients' symptom control.

This study undertook a complex intervention with a high number of components between groups to be compared (physicians completing or not completing the online or traditional training, contributing patients or not contributing patients, patients cared for different physicians, etc.), confounding factors as additional training, outside of the study, received by some physicians, physicians' variability in the care provided to palliative patients, and a variety of outcomes.^{31,32} However, the intervention conducted was consistent in its design and its outcomes.

The main facilitating factors for PCPs to conduct PC in the community are to have access to consultations with the PC team and training in the subject,^{34–36} so more visits of the physicians should improve the likelihood of advanced cancer patients to die at home. The improvement in patient severity scores for symptoms and family anxiety together with the

global QOL scale found in this study show that online training in PC is a valid option to help PCPs care for this population of patients.

Future studies will be very useful to further assess the impact of PC e-learning by PCPs on the control of patients' symptoms and their QOL. According to international recommendations research in PC should evaluate patient and caregiver expectations regarding health care received to improve their QOL and avoid unnecessary visits to emergency services in the final stage of the disease.^{36,37}

Conclusions

When compared with traditional training, online training in PC targeted to PCPs increased significantly their short- and long-term knowledge, reduced the severity of patient symptoms and family anxiety, and increased patients' overall QOL, without showing any significant differences in the rest of patients' symptoms and QOL scales, or in caregiver satisfaction.

Acknowledgments

This work was supported by National Health Research Fund grant PI07051; German Clinical Trials Register DRKS00000694. The study sponsor had no influence on the study design, data collection, analysis, data interpretation, or decision to submit the manuscript for publication.

The authors thank all participants in the study for their collaboration: Valdés-Paredes A, Sanmartín-Almenar A, Rivero-Fabuel B, Sánchez-Alonso B, Pascual-González C, Plana-Andrés C, Tellado-González C, Javier-Porras F, Arrillaga-Ocampo I, Carrillo-Carreño J, García-García JA, Igual-Luis J, Buenadicha-Huguet JL, Carravilla-Parra JL, García-Pascual JN, Arregui-Gorostidi ML, Riadigos-Rodríguez C, Alonso-Sánchez I, Priede-Díaz I, Idarreta-Zubiria M, Revuelta-Puigdollers L, de Zarate-de Manuel V, Arean-González M, María-Tablada MA, González-Echaniz MA, Guzmán-Gomis N, Escondrillas-Wencil P, Pujol-Bengoechea P, Melón-Juncosa P, Valero R, Pertusa S, Hernaiz-Valero S, García-de-Herreros T, Rabell-Iñigo V, Peña-Cereceda Y, González-Gamarra A, Bieva-García A, Isanta-Pomar C, Revuelta-Méndez C, Martín-Calle C, García-Valverde C, García-Orad C, Martínez-González D, Calvo E, Castro-Martín E, Mora-Moreno F, Serrano-Galán FR, Estrada-Bancells G, Martínez-Iglesia J, Recio-Velasco JC, Sánchez-Guerra JC, Luca-Cano JJ, Medina-Martínez A, Vaquero MA, Toribio-González C, Lorca-González T, Sarria-Sánchez T, Briones-Barreiro M, Muñoa-Capron-Manieux M, Palomino-Medina MA, García-Asensio M, Raga-Mari R, Cabrera-Vélez R, Fernández-Rodríguez R, Cacharrón-Bricio R, Santidrian-Arias S, and Cascón-Pérez-Teijón S.

Author Disclosure Statement

No competing financial interests exist.

References

1. Estrategia en Cuidados Paliativos del Sistema Nacional de Salud. Ministerio de Sanidad y Consumo, Madrid, 2007.
2. Alonso-Babarro A, Bruera E, Varela-Caldeira M, Boya-Cristia MJ, Madero R, Torres-Vigil I, De Castro J, et al.: Can this patient be discharged home? Factors associated with at-home

- death among patients with cancer. *J Clin Oncol* 2011;29:1159–1167.
3. Gomes B, Higginson IJ: Factors influencing death at home in terminally ill patients with cancer: Systematic review. *BMJ* 2006;33:515–521.
 4. Esteve MC, Llobera JC, Miralles JX, Bauza MA: Management of terminal cancer patients: Attitudes and training needs of primary health care doctors and nurses. *Support Care Cancer* 2000;8:464–471.
 5. Barclay S, Todd Ch, Grande G, Lipscombe J: Controlling cancer pain in primary care: The prescribing habits and knowledge base of general practitioners. *J Pain Symptom Manage* 2002;23:383–392.
 6. Chumley-Jones HS, Dobbie A, Alford CL: Web-based learning: Sound educational method or hype? A review of the evaluation literature. *Acad Med* 2002;77(10 Suppl):86–93.
 7. Casebeer L, Kristofco RE, Strasser S, Reilly M, Krishnamoorthy P, Rabin A, et al.: Standardizing evaluation of on-line continuing medical education: Physician knowledge, attitudes, and reflection on practice. *J Contin Educ Health Prof* 2004;24:68–75.
 8. Weston CM, Sciamanna C, Nash D: Evaluating online continuing medical education seminars: Evidence for improving clinical practices. *Am J Med Qual* 2008;23:475–483.
 9. Klueber KK, Bruera E: Interactive collaborative consultation model in end-of-life care. *J Pain Symptom Manage* 2000;20:202–209.
 10. Pereira J, Bruera E, Quan H: Palliative care on the net: An online survey of health care professionals. *J Palliat Care* 2001;17:41–45.
 11. Pelayo M, Cebrián D, Areosa A, Agra A, Izquierdo JV, Buendía F, et al.: Effects of online palliative care training on knowledge, attitude and satisfaction of primary care physicians. *BMC Family Practice* 2011;12:37. www.biomedcentral.com/1471-2296/12/37 (Last accessed May 7, 2013.)
 12. Badía X, Muriel C, Gracia A, Nuñez -Olarde JM, Perulero N, Gálvez R, et al.: Validation of the Spanish version of the Brief Pain Inventory in patients with oncology pain. *Med Clin (Barc)* 2003;120:52–59.
 13. Serra-Prat M, Nabal M, Santacruz V, Picaza JM, Trellis, and the Catalan Group for the Study of Palliative Care Effectiveness: Validation of the Spanish version of the Palliative Care Outcome Scale. *Med Clin (Barc)* 2004;123:406–412.
 14. Agra Y, Badía X: Evaluación de las propiedades psicométricas de la versión española del Rotterdam Symptom Checklist para medir calidad de vida en personas con cáncer. *Revista Española de Salud Pública* 1999;73:35–44.
 15. Prieto Rodríguez MA, Lozano Rojas OM, Pascual Martínez N, Arroyo RM: Validación al español del SERVQUAL 2002. *Escuela Andaluza de Salud Pública*.
 16. Hearn J, Higginson J, on behalf of the palliative care Core Audit project Advisory Group: Development and validation of a core outcome measure for palliative care. The palliative care outcome scale. *Qual Health Care* 1999;8:219–227.
 17. White IR, Royston P, Word AM: Multiple imputation using chained equations: Issues and guidance for practice. *Stat Med* 2011;30:377–399.
 18. Bausewein C, Fegg M, Radbruch L, Nauck F, von Mackensen S, Borasio D, et al.: Validation and clinical application of the German version of the Palliative Care Outcome Scale. *J Pain Symptom Manage* 2005;30:51–62.
 19. Eisenchlas HJ, Harding R, Daud LM, Pérez M, De Simone G, Higginson JI: Use of the palliative outcome scale in Argentina: A cross-cultural adaptation and validation study. *J Pain Symptom Manage* 2008;35:188–202.
 20. Ewing G, Rogers M, Barclay S, McCabe J, Martin A, Campbell M, et al.: Palliative care in primary care: A study to determine whether patients and professionals agree on symptoms. *Br J Gen Pract* 2006;56:27–34.
 21. Barboteo JG, Bruera E: Avances en la comunicación médico-paciente en Cuidados Paliativos. (I). Toma de decisiones. Ayudas prácticas en la comunicación. *Med Pal* 2003;10:226–234.
 22. Stajduhar KI, Funk L, Toye C, Grande GE, Aoun S, Todd CJ: Part I: Home based family caregiving at the end of life: A comprehensive review of published quantitative research (1998–2008). *Palliat Med* 2010;24: 573–593.
 23. Rendell JM, Merritt RK, Geddes J. Incentives and disincentives to participation by clinicians in randomized controlled trials. *Cochrane Database Syst Rev* 2007;2:MR000021.
 24. O'Mara MA, Germain SD, Ferrell B, Bornemann T : Challenges to and lessons learned from conducting palliative care research. *J Pain Symptom Manage* 2009;37:387–394.
 25. White D, Hardy R, Gilshenan S, Charles A, Pinkerton R: Randomised controlled trials of palliative care: A survey of the views of advanced cancer patients and their relatives. *Eur J Cancer* 2008;44:1820–1828.
 26. Sherber SN, Powe RN, Braunstein BJ: Personal physicians as study investigators: Impact on patients' willingness to participate in clinical trials. *Contemp Clin Trials* 2009;30:227–232.
 27. Ens CD, Chochinov HM, Gwyther E, Moses S, Jackson C, Thompson G, et al.: Postgraduate palliative care education. Evaluation of a South African programme. *S Afr Med J* 2011;101:42–44.
 28. Koczwara B, Francis K, Marine F, Goldstein D, Underhill C, Olver I: Reaching further with online education? The development of an effective online program in palliative oncology. *J Cancer Educ* 2010;25:317–323.
 29. Pereira J, Palacios M, Collin T, Wedel R, Galloway L, Murray A, et al.: The impact of a hybrid online and classroom-based course on palliative care competencies of family medicine residents. *Palliat Med* 2008;22:929–937.
 30. Dy SM, Hughes M, Weiss C, Sisson S: Evaluation of a web-based palliative care pain management module for house-staff. *J Pain Symptom Manage* 2008;36:596–603.
 31. Arenella C, Yox S, Eckstein DS, Ousley A : Expanding the reach of a cancer palliative care curriculum through Web-based dissemination: A public-private collaboration. *J Cancer Educ* 2010;25:418–421.
 32. Craig P, Dieppe P, Macintyre S, Mitchie S, Nazareth I, Petticrew M: Developing and evaluating complex interventions: The new Medical Research Council guidance. *BMJ* 2008;337:979–983.
 33. May C, Mair S, Dowrick F, Finch L: Process evaluation for complex interventions in primary care: Understanding trials using the normalization process model. *BMC Family Practice* 2007;8:42.
 34. Marshall D, Howell D, Brazil K, Howard M, Taniguchi A: Enhancing family physician capacity to deliver quality palliative home care. *Can Fam Physician* 2008;54:1703.e1–1703.e7.
 35. Löfmark R, Mortier F, Nilstun T, Bosshard G, Cartwright C, Van Der Heide A, et al.: Palliative care training: A survey of physicians in Australia and Europe. *J Palliat Care* 2006;22:105–110.

36. Shipman C, Gysels M, White P, Worth A, Murray AS, Barclay S, Forrets S, et al.: Improving generalist end of life care: National consultation with practitioners, commissioners, academics, and service user groups. *BMJ* 2008;337:848–851.
37. Bennet I, Davies A, Higginson J: Delivering research in end-of-life care: Problems, pitfalls and future priorities. *Palliat Med* 2010;24:456–461.

Address correspondence to:
Marta Pelayo-Alvarez, MD
Primary Care Health Centre, Algemesi
46680 Algemesi, Valencia
Spain

E-mail: mpelayo@ribera10.com