

A survey of wound care knowledge in South Africa

Francois Coetzee¹, Johan Coetzee², Dirk Hagemeister³

¹ Department of Family Medicine, Stellenbosch University

² Department of Anaesthesiology and Critical Care, Faculty of Health Sciences, Stellenbosch University

³ Division Family Medicine and Primary Care, Stellenbosch University

Correspondence to: Francois Coetzee (franna@cornergate.com)

Abstract

Chronic wounds afflict millions worldwide, incurring significant health care costs and chronic suffering. Clinicians are often unsure about treatment, resulting in poor outcomes.

Objective. To determine the scope of knowledge possessed by fifth-year medical students, general practitioners (GPs) and surgical registrars, concerning chronic wound management.

Design. Cross-sectional study.

Methods. Deans of eight South African medical schools received letters requesting information regarding time devoted to wound-care training. Knowledge-based questionnaires were distributed to final-year students at two universities, surgical registrars at four universities and GPs attending refresher courses.

Results. Four medical schools replied, of whom only two offered formal teaching. 162 medical students, 45 GPs and 47 surgical registrars completed questionnaires. The overall median (25th - 75th percentiles) knowledge scores for registrars, GPs and students were 65% (55 - 70%), 55% (45 - 65%) and 45% (35 - 50%) respectively. Whereas the scores of registrars and GPs did not differ, the student scores were significantly less. Only 32% of registrars and 18% of GPs attained scores of 70% or more. 96% considered training to be inadequate. Interest in wound care was only mild to moderate, with more GPs than registrars requesting literature.

Conclusions. Very little, if any, training on chronic wounds is offered in South Africa. The levels of knowledge cannot be considered adequate for successful treatment, nor for teaching to undergraduates. This preliminary study cannot reflect the attitudes and knowledge throughout the country. However, it is clear that there is a need for improved education about these conditions that have huge clinical and economic consequences.

Introduction

A chronic wound is defined as any break in skin integrity that persists for longer than 6 weeks or recurs frequently.¹ The main causes for these wounds include vascular insufficiency, complications of diabetes, skin damage due to pressure and postoperative complications. Chronic wounds affect 2.8 million patients in the USA² and 4 million in Germany,³ the prevalence being 120 per 100 000 between the ages of 45 and 65 years, increasing to more than 800 per 100 000 in patients older than 75.2 years.² The cost to health care systems is enormous, amounting to billions of dollars. For example, in 1992 treatment of venous leg ulcers accounted for 1.3 - 2% of the annual health care costs of the UK, France and Germany.⁴ In 2005, the USA spent \$2.3 billion on advanced wound care products. This is expected to rise at an annual growth rate of 12.3% to \$4.6 billion in 2011.³ In Germany, the cost is 5 billion euros annually.³ Additionally there are losses to countries' economies as these lesions are often socially isolating, take years to heal and recur frequently. Most important is the reduced quality of life experienced by these patients and their families. In spite of the prevalence of chronic wounds, wound care education is regarded as inadequate in the USA⁵ and in Germany.³ A Canadian study reported that most family physicians feel ill-prepared to manage pressure ulcers, suggesting that they do not receive enough training in this disorder.⁶ Canadian nurses express little confidence in the knowledge of physicians who supervise treatment of chronic wounds.⁷

In South Africa, chronic wound care is often left to unsupervised nursing personnel, who may or may not seek help from medical practitioners, especially in primary health care clinics where standards of

care may vary. At present many practices are derived from questionable sources such as from company representatives and time-honoured procedures that are conveyed by word of mouth.⁸ Improper wound care leads to prolonged hospital admissions and prolonged healing times that result in wastage of limited resources.³ Conversely, it has been shown that wound education campaigns have beneficial effects on the use of resources and on patient outcomes such as duration of hospital stay and time to achieve wound healing.^{3,9}

During 8 years of rural hospital practice one of the authors (FC) has repeatedly been faced with patients who had complicated, non-healing wounds. It became apparent that knowledge in this regard was scanty and that treatment guidelines were not readily available. At present there is no information regarding the adequacy of chronic wound care knowledge in South Africa. The purpose of this cross-sectional study was (i) to ascertain how much time is devoted by South African medical schools to formal teaching about chronic wound care; and (ii) to determine the state of knowledge about wound care among general practitioners (GPs), surgical registrars and final-year medical students.

Methods

Approval for the study was obtained from the Health Research Ethics Committee of Stellenbosch University. A questionnaire was compiled from evidence-based resources regarding chronic wound treatment.¹⁰ The draft was sent to the president of the Wound Healing Association of South Africa (WHASA), who subjected it to scrutiny by a panel of experts attending the 3rd National Conference of WHASA (Durban, April 2009),

validated the questions and made recommendations. The final, approved questionnaire comprised two sections. The first included items to identify covariates that may influence wound care knowledge (age group, gender, institution, level of training, qualifications held, professed level of interest in wound care and their opinion of the adequacy of their wound care training). The second consisted of 20 knowledge-related, multiple-choice questions that were grouped into four domains concerning (i) dressings; (ii) diabetic foot ulcers; (iii) stasis ulcers; and (iv) pressure ulcers. To each questionnaire an information leaflet was attached that set out the aims of the study, assuring participants that their contributions were voluntary and anonymous. A copy of the questionnaire and the correct answers can be obtained via e-mail from the corresponding author.

Letters were sent to the deans of the eight medical schools in South Africa explaining the purpose of the study and requesting information with regard to the number of hours of formal instruction that are devoted to teaching wound care to undergraduate medical students, surgical registrars and family medicine registrars. In addition permission was requested from certain universities to distribute the questionnaires to students and registrars. A copy of the Ethics Committee approval was attached to each letter. On obtaining permission, questionnaires were handed out directly to registrars and final-year students during pre-arranged personal visits to two local institutions and the remainder were mailed to the two distant universities who had responded to the letters. Questionnaires were distributed among GPs during regional, continued professional development activities and during a GP conference held at the University of Cape Town (Division of Family Medicine GP conference, 13 - 15 January 2010).

Calculation of sample size

Regarding analysis of variance (ANOVA) of three groups: If a meaningful result is obtained when two score means differ by 33% (standard deviation 40% of the smallest), the required sample size to detect a difference with an alpha value of 0.05 and power of 0.9 is 30 per group. Additionally, to detect a difference between the proportions of three groups with a power of 0.8, presupposing an effect size (W) of 0.33, requires a total sample of 89. It was decided to collect a minimum of 30 completed questionnaires from each of the three groups.

Statistical analysis

Inter-group comparisons of numerical data were done using ANOVA. If the data did not meet the assumptions for performing parametric tests (Gaussian distribution of the underlying population and equal variances), or if the data were ordinal, equivalent, non-parametric, distribution-free tests were performed (Kruskal-Wallis ANOVA), followed by Dunn's *post-hoc* multi-comparison tests. Proportional data were analysed using chi-square and Fisher's exact tests where appropriate. Multiple linear regression with the knowledge scores as the dependent variable was performed to identify covariates that may influence wound-care knowledge. An alpha value of 0.05 was accepted as indicating a significant result.

Results

Four deans responded to the letters, of whom only two stated that there was formal wound-care teaching: for undergraduates 2 h and 20 h, for family medicine registrars 3 h and 4½ h, for surgical registrars 0 h and 50 h, respectively. Two universities returned questionnaires completed by students, and three universities returned questionnaires from surgical registrars. The response rate was 71%, resulting in 257 questionnaires received, of which three were incomplete. Completed questionnaires comprised 45 from general practitioners, 47 from registrars and 162 from students.

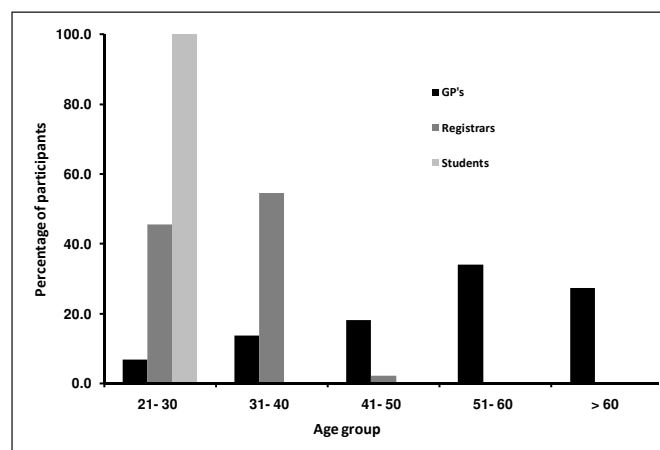


Fig. 1. Proportions (%) of participants according to age group.

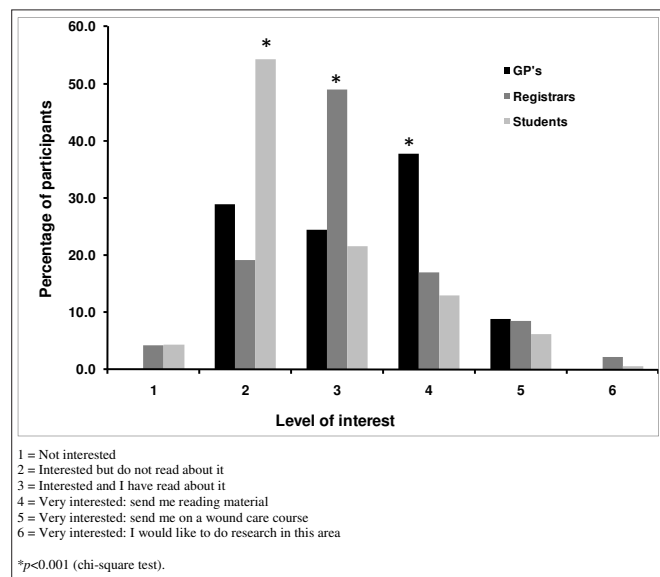


Fig. 2. Proportions (%) of participants' interest in wound care.

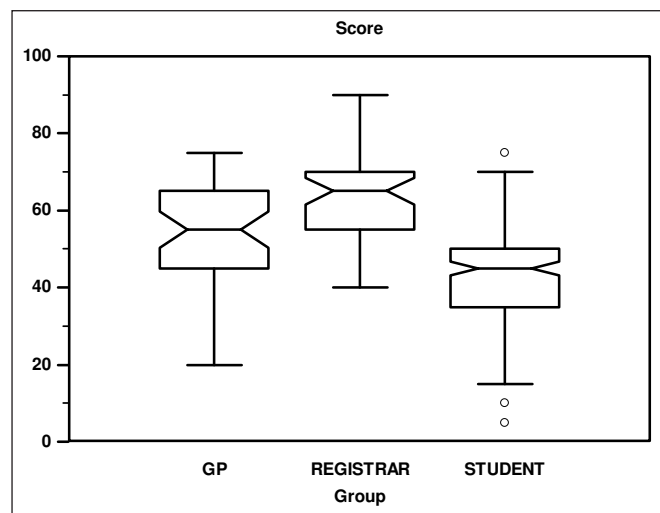


Fig. 3. Notched box and whisker plots of knowledge scores obtained by the various groups. Notches = 95% confidence intervals; lines joining notches = median values; horizontal box borders = 25th & 75th percentiles; whiskers = range of values; circles = outliers.

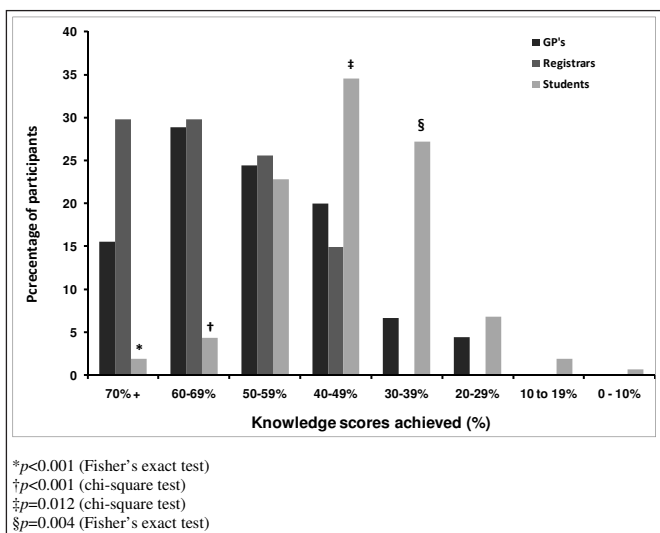


Fig. 4. Distribution of percentages of correct answers for the three groups.

This response rate is made up out of: 35 out of 110 general practitioners attending a GP conference (31%), 10 out of 10 general practitioners attending a CPD meeting (100%), 133 fifth-year medical students out of a class of 160 (83%), 29 out of a group of 30 medical students (97%) and 47 out of 47 registrars returned completed questionnaires (100%).

The age-group distribution of participants is depicted in Fig. 1. All students fell within the age group 21 - 30 years, while registrars were approximately equally distributed between 21 - 30 and 31 - 40 years. Most GPs were aged 40 - 60 years. The proportion of males and females was equal (50.4% and 49.6%). Postgraduate degrees (MMed or College of Medicine fellowship) were held by 7 GPs and 4 registrars. One GP had earned a diploma in wound care therapy.

Participants' interest in chronic wound care according to a scale of 1 - 6 is displayed in Fig. 2. Less than 10% of each group expressed keen interest in wound care (levels 5 & 6). Significantly more GPs than registrars and students were sufficiently interested to request literature on the subject (level 4) (38% v. 17% and 13%; $p < 0.001$). More registrars than GPs and students were only mildly interested (level 3) (49% v. 24% and 22%; $p < 0.001$). The majority of students (54%) professed interest but did not read about the subject (level 2) and this proportion was greater

Level	N	Percentiles			
		Median	(25 - 75th)	95% CI	Range
GPs	45	55*	45 - 65	50 - 60	20 - 75
Registrars	47	65*	55 - 70	50 - 65	40 - 90
Students	162	45	35 - 50	40 - 45	5 - 75

Results are expressed as percentage of correct answers out of a total of 20 questions.
 N = number of participants.
 $p < 0.001$ (ANOVA).
 *GPs and registrars differ significantly from students, but not from each other ($p < 0.05$).

than those of the GPs (29%) and registrars (19%); ($p < 0.001$). Of registrars and students 4% admitted that they were not interested. Median interest levels indicated moderate interest among GPs (3[2-4]) and registrars (3[3-4]), but low among students (2[2-3]); ($p < 0.001$).

96% of the 254 participants were of the opinion that the training that they had received regarding chronic wound care was either 'totally inadequate' (137) or 'too basic' (108). Five registrars, 2 GPs and 1 student thought that their training was 'appropriate' and 1 registrar that it was 'advanced'.

Numerical data were not normally distributed; results are reported as median values (25th - 75th percentiles) and where appropriate, 95% confidence intervals (95% CI). The highest score (90%) was achieved by a registrar and the lowest score (5%) by a student. Details of the results that were achieved by the three groups are presented in Table I and Fig 3.

Table II. Proportions of participants who achieved certain knowledge scores and greater

	Knowledge score		
	70% +	60% +	50% +
GPs (%)	18* (9 - 31)	47* (33 - 61)	69* (54 - 81)
Registrars (%)	32* (20 - 46)	62* (47 - 74)	85* (72 - 93)
Students (%)	3 (1 - 6)	7 (4 - 12)	30 (23 - 37)

Data are presented as percentages of the total possible score (95% confidence interval).
 70% +; 60% +; 50% + = scores of 70% and greater, etc.
 * GPs and registrars differ significantly from students, but not from each other ($p < 0.05$).

Surgical registrars achieved the highest median score (65% [55 - 70%]) which was not significantly different from that of the GPs (55% [45 - 65%]). The low median score by the students (45% [35 - 50%]) differed significantly from both practitioner groups. The proportions of the three groups that achieved certain knowledge scores and greater are presented in Table II. In all these analyses, the students' scores differed significantly from the practitioners (Table II and Fig. 4). Again, the practitioner groups did not differ from each other.

Whereas the proportions of students who attained scores above 50%, 60% and 70% differed from the GPs and registrars, these proportions did not differ between the two practitioner groups. An analysis by intervals of the scores achieved by the three groups is presented in Fig. 4.

Table III depicts the scores achieved in the four knowledge categories (dressings, diabetic foot ulcers, stasis ulcers and pressure ulcers). All three groups fared the best in the venous stasis category and worst in the wound dressing selection category. Here too, students scored significantly less than the GPs and registrars, whose scores did not differ between each other. Table IV depicts the scores achieved by the groups from the three medical schools. The students from university B attained slightly higher median scores than those from university C (45% v. 40%; $p < 0.001$). The scores achieved by the three registrar subgroups did not differ.

Backward stepwise regression indicated three covariates that influenced the knowledge scores, namely the institution attended by the stu-

Table III. Correct answers for each category of knowledge by level of training

Category	Level	N	Median	Percentiles (25 - 75th)	p (ANOVA)
Dressings	GPs	45	2*	1.75 - 3	<0.001
	Registrars	47	2*	2 - 3	
	Students	162	1	1 - 2	
Diabetes	GPs	45	3*	2 - 3	0.003
	Registrars	47	3*	3 - 4	
	Students	162	3	2 - 3	
Pressure sores	GPs	45	3*	2 - 3.25	<0.001
	Registrars	47	3*	2 - 4	
	Students	162	2	1 - 3	
Venous stasis	GPs	45	4*	2 - 4	<0.001
	Registrars	47	4*	3 - 4	
	Students	162	2	1 - 3	

Maximum score per category = 5.

*GPs and registrars differ from students, but not from each other.

Table IV. Knowledge scores achieved by the groups from the three participating medical schools

Group		Univer- sity A	Univer- sity B	Univer- sity C	p (ANOVA)
Regis- trars	Mean	57.9	66.3	58.5	0.069
	(SD)	(9.3)	(13.4)	(11.1)	
	N	21	16	10	
Students	Median		45	40	<0.001
	(25 - 75th)		(41 - 55)	(35 - 45)	
	N		31	131	

[25 - 75th] = 25 - 75th percentiles
N = number of participants.

wound care training where the mean was 9.2 hours. In Germany and the UK, the hours of wound-care training were 9.0 and 4.9 respectively.³ The vast difference in training offered for surgery registrars at the two medical schools that responded is unusual. One medical school indicated that they offered no training, and the other that they offered 50 hours of training. I suspect both medical schools offered little or no training in the form of lectures. I contacted the person who indicated 50 hours, and he explained that he regarded ward rounds and clinical discussions as their formal training in wound care.

To our knowledge this is the first survey to test wound-care knowledge among undergraduate students in South Africa. It is not surprising that pre-final-year students scored less than practitioners, considering that their exposure to chronic wound care is short, mainly theoretical and constitutes at best a minor component of a busy, multifaceted curriculum. However, their median score was a poor 45% (95% CI 40 - 45%), indicating that on leaving medical school they are not equipped with the necessary knowledge to treat chronic wounds and are forced to pick up skills by means of self-instruction. Nevertheless 3 out of 162 students achieved scores $\geq 70\%$ and 7 scored between 60% and 69%. This probably indicates that students learn about wound care in a disorganised manner and that the traditional, discipline-based undergraduate curriculum has resulted in a fragmented approach to wound-care education.¹¹ Knowledge scores achieved by students from two of the three participating medical schools differed significantly. Whereas the dean of the lower-scoring group did not reply to our letter, the dean of the higher-scoring group indicated that their students received 2 hours of training. The result was that it was not possible to determine whether undergraduate wound-care instruction had any influence on the scores attained by the students.

Registrars appeared to have scored better than the GPs (Table I, Fig. 2). However, the difference did not achieve statistical significance. The study was probably underpowered to detect a real underlying difference; however, the median difference was only 5% and the confidence interval of the difference between the medians was quite wide (0.00% - 10.00%), so that if a real statistically significant difference does exist, it is unlikely to be of practical importance. It is possible that the GP knowledge scores do not reflect the true situation in South Africa as there may have been selection bias due to the fact that the GPs were all attendees at refresher courses and may represent a group who were particularly enthusiastic about continued professional development (CPD).

dents and registrars, the level of training (student, GP or registrar) and the age group ($r=0.58$, $r^2=0.34$, Durbin-Watson statistic 1.7). The following covariates were rejected from the model: gender, qualifications, and professed interest.

Discussion

The finding that nearly all respondents (96%) regarded their training in wound care as inadequate is in accordance with previous surveys in other countries. Over 70% of a sample of 155 family physicians in Minnesota felt that they were ill-prepared to manage pressure ulcers.⁶ In Canada only 16% of 107 family physicians felt confident about their ability to manage leg ulcers and 61% reported that they did not know enough about wound-care products.⁴ In a survey among Canadian home-care nurses, nearly half (48%) indicated that although initial treatment planning was usually done by family physicians, they could not rely on them to have up-to-date information on leg-ulcer treatment.⁷ Furthermore, more than half reported receiving patients with less-than-adequate diagnostic workup or stated disease aetiology and that initial treatments ordered by physicians were inappropriate.

The 50% response rate by the deans of the eight medical schools is disappointing. Taken together with the fact that only two of the respondents stated that wound care was formally taught and then only for a few hours, it is perhaps an indication of how unimportant wound care is perceived to be in South African universities. There appears to be a similar attitude towards wound-care education in the USA, Germany and the UK. Patel *et al.*⁵ reported that in 2005 only 50 of 100 American medical schools documented any educational time dedicated to undergraduate

If a knowledge score of 70% is regarded as indicating sufficient knowledge to treat various types of chronic wounds successfully, then only small proportions of practitioners and future practitioners qualify (Table II). By this standard, taking the GPs and registrars sampled together, 75% (69/92) (95% CI from 65% to 83%) of GPs and trainee surgeons do not possess adequate knowledge to treat chronic wounds. Even if a score of 60% is regarded as acceptable, then approximately half of clinicians are probably inadequately trained (46%; 95% CI from 36% to 56%). These findings are alarming, because not only do the large number of wrong answers possibly indicate that practitioners are actually applying potentially harmful treatments, but these practices are probably being taught to students during the little clinical teaching to which they are exposed.

GPs were more interested in receiving wound-care literature than the registrars. However, the general levels of interest were quite low (38% of GPs v. 17% of registrars). These are surprising findings considering that both groups regarded their training as having been inadequate. This may indicate that a greater number of GPs have to treat chronic wounds or alternatively that registrars are confident about their wound-care knowledge. On the other hand, it may also reflect a general feeling of apathy towards treatment of chronic wounds.

There are some weaknesses to this study. If the authors would have been able to visit each university personally, a better response rate might have been obtained, to gain a more complete picture of the situation in South African medical schools. Furthermore, there may have been selection bias with regard to the GP group; therefore the results of this small study cannot be regarded as being a true reflection of the state of knowledge countrywide. This study comprised the thesis for a Master's degree in family medicine (FC); hence for logistical and financial reasons it was not possible to extend it further. Secondly, it was not possible to perform an in-depth evaluation of the participants' knowledge using only 20 multiple-choice questions. Nevertheless this limited survey does indicate that there are serious deficiencies in the wound-care knowledge of clinicians as well as, importantly, future practitioners.

Conclusions

In spite of the limitations and weaknesses of this preliminary study, certain conclusions can be made about the care of patients with chronic wounds in South Africa.

- Nearly all students and practitioners regard their training as inadequate.
- As in other countries, time allocated to formal teaching varies widely and, in addition, appears to be insufficient.
- GPs appear to glean knowledge after leaving medical school. The knowledge possessed by most final-year students and a large proportion of practitioners (GPs and registrars) appears to be deficient.
- Despite the huge financial and clinical significance, little importance is attached to teaching about chronic wounds. Furthermore, there appears to be a general lack of interest therein.
- Surgical registrars may possess insufficient knowledge to act as teachers during a wound-care module.

In order to obtain a more comprehensive estimate of the extent of the problem a similar study needs to be extended to all medical schools and

to include a larger, more representative GP sample as well as the nursing profession. This might eventually lead to a concerted effort to improve wound-care education to be launched by the various role players. Guidance from other countries should be sought where various strategies have already been investigated. These include dissemination by telemedicine, website-based courses, consensus guidelines, ward rounds, self-study material and lectures or workshops.¹¹⁻¹⁵ A study of the deficiencies of wound-care training in English medical schools led to recommendations by the General Medical Council's Committee for Undergraduate Medical Education.¹¹ Included were suggestions that wound-care education should be integrated with the basic sciences, it should promote self-learning and it should make use of available technologies to the advantage of learners. Some South African medical schools are in the process of revising their curricula and this could present an excellent opportunity to include a formal module on the management of wounds. Designing such a module may prove challenging, since there is a wealth of available knowledge and a limited amount of time to be allocated. Perhaps the medical schools should attempt to achieve consensus with regard to such content in collaboration with WHASA.

References

1. Fonder MA, Lazarus GS, Cowan DA, Aronson-Cook B, Kohli AR, Mamelak AJ. Treating the chronic wound: A practical approach to the care of nonhealing wounds and wound care dressings. *J Am Acad Dermatol* 2008;58:185-206.
2. Page JC, Newswander B, Schwenke DC, Hansen M, Ferguson J. Retrospective analysis of negative pressure wound therapy in open foot wounds with significant soft tissue defects. *Adv Skin Wound Care* 2004;17:354-364.
3. Patel NP, Granick MS, Kanakaris NK, Giannoudis PV, Werdin F, Rennekampff HO. Comparison of wound education in medical schools in the United States, United Kingdom, and Germany. *Eplasty* 2008;8:e8.
4. Graham ID, Harrison MB, Shafey M, Keast D. Knowledge and attitudes regarding care of leg ulcers. Survey of family physicians. *Can Fam Physician* 2003;49:896-902.
5. Patel NP, Granick MS. Wound education: American medical students are inadequately trained in wound care. *Ann Plast Surg* 2007;59:53-55.
6. Kimura S, Pacala JT. Pressure ulcers in adults: family physicians' knowledge, attitudes, practice preferences, and awareness of AHCPR guidelines. *J Fam Pract* 1997;44:361-368.
7. Graham ID, Harrison MB, Moffat C, Franks P. Leg ulcer care: nursing attitudes and knowledge. *Can Nurse* 2001;97:19-24.
8. Ashton J, Price P. Survey comparing clinicians' wound healing knowledge and practice. *Br J Nurs* 2006;15:S18-S26.
9. Schultz GS, Sibbald RG, Falanga V, et al. Wound bed preparation: a systematic approach to wound management. *Wound Repair Regen* 2003;11(Suppl 1):S1-28.
10. Jones KR, Fennie K, Lenihan A. Evidence-based management of chronic wounds. *Adv Skin Wound Care* 2007;20:591-600.
11. Davis M. Wound-care training in medical education. *J Wound Care* 1996;5:286-287.
12. Flanagan M. A contemporary approach to wound care education. Education must enable the practitioner to replace traditional and out-dated practices in wound care with research-based practice. *J Wound Care* 1995;4:422-424.
13. Gottrup F. Optimizing wound treatment through health care structuring and professional education. *Wound Repair Regen* 2004;12:129-133.
14. Jones ML. E-learning in wound care: developing pressure ulcer prevention education. *Br J Nurs* 2007;16:S26-S31.
15. Jones SM, Banwell PE, Shakespeare PG. Telemedicine in wound healing. *Int Wound J* 2004;1:225-230.