

EXPERIENCE EXCHANGE

Improving the community nursing experiences of nursing students

Karlen E. Luthy, Renea L. Beckstrand, Lynn C. Callister

Brigham Young University, Provo, Utah, United States

Correspondence: Karlen E. Luthy. Address: College of Nursing, Brigham Young University, 355 SWKT, Provo, UT 84602-5432, USA. Telephone: 801-422-6683. Fax: 801-422-0536. Email: Beth_luthy@byu.edu.

Received: May 14, 2012

Accepted: June 13, 2012

Online Published: December 3, 2012

DOI: 10.5430/jnep.v3n4p12

URL: <http://dx.doi.org/10.5430/jnep.v3n4p12>

Abstract

Community nursing is necessary to the overall health of populations and presents nursing students with unique opportunities to care for entire communities. In addition, it is important for nursing students to develop culturally competent skills to care for a global community, regardless of their geographic location during school or in practice. Limited in nursing practices and skills, first year nursing students are often resigned to assist with health screenings during clinical experiences which do not accurately represent the community nurse profession. The aim of this study was to evaluate the experiences of nursing students in a 7 week course designed to develop community nursing and cultural competence among junior and senior nursing students. It seems community-based clinical hours are more valuable to students when completed in one community rather than a short series of clinical hours in various communities and when placed later in the curriculum. Additionally, selecting culturally diverse communities can also provide students with opportunities to develop cultural competence.

Key words

Community nursing, Cultural competence, Nursing students

1 Introduction

Nursing in the community is unique and necessary to the overall health of populations. It presents nursing students with opportunities to alleviate suffering and to advocate health care for whole communities. Since only 30% of nursing services are provided in acute care settings^[1], nursing care is shifting largely from the hospital to other community-based, primary health care services. In fact, according to the International Council of Nurses, the majority of nurses are now employed in the public sector, not the hospital^[2]. Consequently, nursing education programs need to ensure that nursing students are well-equipped with the clinical skills and community nursing clinical experiences essential to providing quality nursing care for an entire community.

Nurse educators can be instrumental in providing not only community nursing experiences, but fostering the development of clinical skills to include an understanding of the nurse's role in improving the health of a community^[3,4]. Providing a quality nursing student experience in the community requires careful consideration of clinical placement and design of assignments that reinforces clinical concepts. Requiring only one or two community nursing assignments per course are

inadequate for students to truly gain an appreciation for the nursing skills required to work in a community-based setting^[5].

In addition to providing nursing students with a community-based experience, they also need to learn the process of recognizing cultural differences within an ethnic community and then integrating an understanding of cultural diversity into nursing practice^[6]. Both are key components of community nursing and influence the quality of care being delivered^[7]. Indeed, the need for nurses to develop cultural competence, regardless of geographic location, is becoming more important as individuals from around the world migrate from their native cultures to foreign cultures^[8]. Courses designed to help nursing students distinguish relationships between cultural factors and lifestyle practices, as well as identify socioeconomic and environmental factors in communities, strengthens the nursing student's ability to adequately care for culturally diverse individuals.

Students who take community health nursing during their first semester of nursing school often lack the clinical experience and skills to participate in little more than very simple screening tests during their clinical hours and even then, lack the experience to deliver culturally competent care. Our faculty assumed that such limited exposure to routine activities of a community health nurse did not produce the learning outcomes we had hoped. In fact, our students often informally stated that they valued the acute care clinical experiences more than the community-based clinical experiences. Consequently, an additional opportunity for a community nursing clinical experience was combined with a Global Health and Human Diversity in Nursing (GHHDN) course wherein junior and senior nursing students could learn and implement culturally appropriate community nursing interventions in a community-based setting, and to assess whether or not such a course could improve the community nursing learning experiences and perceptions of community nursing by nursing students.

Enrolling for a 7 week course during spring term, nursing students traveled to a rurally located school-based clinical site with faculty to conduct their GHHDN coursework. While at the clinical site, students were required to conduct a community assessment and family assessment, each of which included implementation of interventions and post-intervention evaluations. Curious as to how the intense 7 week community-based clinical improved upon the community nursing experiences of nursing students, a short questionnaire was developed to assess the students' perceptions of community nursing before and after the clinical rotation. The purpose of this article is to describe a GHHDN course designed to improve the community nursing experiences of nursing students, and to report any changes in student beliefs and perceptions regarding community nursing, as well as culturally competent nursing, after participating in a 7 week community-based clinical experience.

Research questions

- 1) Will involvement in a 7 week community-based clinical experience, within a culturally diverse population, influence the beliefs and perceptions of nursing students regarding community nursing?
- 2) Will involvement in a 7 week community-based clinical experience, within a culturally diverse population, improve the understanding of nursing students regarding community nursing?
- 3) Will cultural competence be developed by nursing students who complete a 7 week community-based clinical experience within a culturally diverse population?

2 Methodology

2.1 Participants

Following Institutional Review Board approval, a convenience sample of eight nursing students were informed of the study. Although a power analysis may have been useful to determine sample size, this was an exploratory study regarding the clinical experiences of students enrolled in one section of GHHDN to determine if cultural diversity could be

successfully incorporated with a community nursing experience. Because our student-to-faculty ratio in the clinical setting is 1:8, only eight students could be enrolled in the rurally located section of the course because there was only one faculty member assigned to teach the course. To be eligible for participation, subjects needed to be junior or senior nursing students who had completed a community health nursing course during their first semester of nursing school. While all junior and senior nursing students were eligible to participate, only the first eight students to register for the course were accepted. Of the participants, 7/8 had completed all of their requirements for graduation except for a GHHDN course and a final precepted internship. The eighth student had completed approximately half of the nursing curriculum. Five of the students were female and three were male. All students were between the ages of 20-27 years and all were Caucasian.

2.2 Setting

The GHHDN course was already previously required by our College of Nursing as part of the curriculum, although the original objective of the course was to expose students to different cultures, rather than to focus on community nursing experiences. The College of Nursing is located at a private university located in the western United States. Each of the students enrolled in the course understood that they would be traveling, once per week, to a rural community for their GHHDN requirement, and that the coursework would focus on incorporating cultural competence with community nursing.

2.3 Design

During spring term, eight registered students traveled to a rural setting within the state for 5 consecutive weeks. On the first day of class, the students received an informed consent document, explaining the purpose of the study and that students could opt out of the study without any consequence to their grade. For those who opted to participate, informed consent was obtained and a pre-test questionnaire was distributed on the first day of class. At the conclusion of the course, the same students were asked to complete the same questionnaire as a post-test evaluation. Students were also notified that, if they opted to participate, their reflective writing assignment would also be evaluated for themes regarding their perspectives of community nursing. No points were assigned to completion of the questionnaires, although the reflective writing assignments were part of the regular coursework and were associated with points for completion. The participants could opt out at any time without consequence, although they still needed to complete their reflective writing assignments as part of the regular course. All students were assured their names would not be divulged.

2.4 Instrument

To design the student questionnaire for use during the pre- and post-test, searches of electronic bibliographic databases were conducted to identify studies of nursing students' perceptions of community nursing. Databases utilized in the search included MEDLINE, MEDLINEplus, EBSCO, PubMed, CINAHL, and Web of Science. In addition, the Essentials of Baccalaureate Education for Professional Nursing Practice from the American Association of Colleges of Nursing was reviewed. Despite an exhaustive search of the literature, however, no previous studies of a similar nature were discovered.

With no established tool in the literature, questionnaire design ensued. Questions were developed by a faculty member who was also an experienced community health nurse. There were three demographic questions, including gender, age, and race. In addition, the questionnaire consisted of 19 questions on a Likert scale, 12 questioning the students on their beliefs regarding community nursing and 7 regarding the student's own personal perceptions of community nursing. The final question was open-ended, inviting the student to share any other thoughts or comments they had about community nursing, in general.

2.5 Data analysis

Responses were entered into an SPSS (SPSS, Inc, Chicago, Ill) database. Accuracy of data was checked by two researchers. While one researcher read marked responses from the returned questionnaires, the second researcher verified

that data were correct on the printout. All eight surveys were checked in this manner. Frequencies were calculated for all items and the data were compared using a pre-post evaluation design.

3 Community background

Since most families in the rural community had children attending the local elementary school, the school seemed to be the ideal choice for a targeted community assessment and intervention. The facility was a small and underprivileged school consisting of approximately 200 students. Almost 80% of the students enrolled in the elementary school were Hispanic, in comparison to the 11% state average. Ninety percent of these children belonged to families at or below poverty level hence accounting for a staggering 99% of students who were eligible for the free or reduced-price lunch program. Moreover, the remote location of the community restricted family access to health care services.

4 Course description

The course included both didactic and clinical instruction for 4 hours of credit and fulfilled the university requirement for cultural diversity, as well as nursing credit. During the course, students were guided through the process of conducting a comprehensive community assessment, implementing a nursing intervention, and then evaluating the effectiveness of the intervention. In addition, the students were instructed on providing culturally competent care of an underserved, vulnerable, and disadvantaged minority population. During the course, students traveled to a rural setting within the state for 5 consecutive weeks. The week prior to travel, students participated in course orientation and received instruction on the predominant culture within the community. During the 5 weeks of travel to and from the community site, students engaged in community-based interactions 2 days each week by traveling to the site on Thursday, staying overnight, and returning home Friday evening. Students participated in a variety of clinical activities on an average of 25 hours per week for a total of 125 clinical hours. In addition, students spent approximately 5-10 hours per week outside of class on planning and preparing for clinical activities the upcoming week. The final week of class students participated in classroom presentations regarding their community, family, and classroom interventions.

Clinical hours included a community assessment of the school, identification of a nursing diagnosis, planning an intervention, implementing the intervention, and then evaluating the intervention. In addition, the students conducted weekly home visits to families identified by school representatives as needing assistance. Finally, the students were responsible for conducting health teaching in all classrooms on a weekly basis. Coursework included completion of 1) a formal and written assessment of the community including nursing diagnosis, plan, intervention, and evaluation; 2) a verbal presentation on family home visits which outlined the nursing diagnosis, plan, and intervention for the families; 3) health teaching outlines and weekly classroom presentations; and 4) reflective writing assignments.

4.1 Community assessment

After researching the city and the school, the students interviewed key community representatives such as school administrators, teachers, elementary school students, public health representatives, clergy, and social workers, asking each to identify health-related issues with which they needed assistance. As a result, the nursing students identified hygiene issues among school children, childhood obesity, and behavioral disorders as critical issues necessitating nursing intervention. Accordingly, nursing students designed their health teaching coursework to address the most worrisome hygiene issues of cleanliness, hand washing, and dental hygiene. The issue of childhood obesity was addressed with healthy eating and physical activity teaching. These health lessons corresponded with individual student and classroom contests to become physically fit. Finally, nursing students held weekly group sessions with students who exhibited behavioral issues. During these group sessions, nursing students identified elementary students who required further follow up by a health care provider and appropriate resources available to the family of the student.

The nursing diagnoses, intervention plans, and implementation of interventions were planned with consideration for cultural appropriateness. For example, before providing education on childhood obesity with students, nursing students researched common dietary practices in the Hispanic culture. Nursing students also gained familiarity with cultural practices involving food and family celebrations or commonly observed holidays. Likewise, nursing students incorporated interventions regarding physical activity after careful consideration of popular physical activities within the culture.

Nursing students were required to submit the written portion of the community assessment (completed as a group assignment) at the end of the term. The community assessment outline was adapted from an assessment published in Clark's *Community Health Nursing: Caring for Populations* [9]. Guiding the nursing students through the steps of a community assessment, the outline (see Table 1) included a comprehensive description of the community, environment, demographics of the population, social system, community strengths, areas for improvement, nursing diagnoses, nursing interventions, plan of care, and measurements utilized to evaluate the successfulness of the students' nursing interventions.

Table 1. Outline for Written Community Assessment Assignment

| Category | Explanation |
|-------------------------------|---|
| Community | Describe the location and the geographical or physical boundaries. |
| Environment | Consider the following: Are there water or sanitation issues? Are there any safety hazards? Is there access to health care services (clinic/hospital)? What is the predominant status of health insurance? Is there access to emergency services (911)? What health education services are available? What are the most prevalent communicable diseases? Is proper nutrition a problem? Are there any common health problems? What are the immunization rates? What modes of transportation are available? What is the socioeconomic status? What recreation activities are popular? |
| Demographics of Population | Collect data regarding community such as: Age distribution Gender distribution Predominant cultural groups Predominant religious groups |
| Social System | Consider how the political system influences health outcomes in the population. Identify the primary role of communication in relaying health information to the population. |
| Strengths | Identify strengths of the community. |
| Areas for Improvement | Describe community areas in need of improvement. |
| Nursing Diagnoses | Construct at least three nursing diagnoses. |
| Nursing Intervention(s) | Tie each nursing intervention to the applicable nursing diagnosis. |
| Plan | Describe the plan for implementing each intervention. |
| Evaluation of Intervention(s) | Was the community intervention successful? Describe measurements used for evaluation. |

(Adapted from Clark MJ. *Community Health Nursing: Advocacy for Population Health*. (5th ed.). New Jersey: Prentice Hall; 2008: 356-363)

4.2 Home visitation

Some families were identified as needing additional assistance by the community social worker. In pairs, nursing students visited the identified families every week, identifying health care needs and working toward resolution of the various

health issues. Family health needs varied but included such issues as inability to pay for psychiatric or diabetes medications, child safety and supervision, teenage pregnancy, depression, and self-mutilation and transient suicidal tendencies. Feeling somewhat ill-prepared to address complex family issues, nursing students often spent many hours outside class and clinical researching health issues and appropriate treatments, identifying community resources, and coaching families on applying for assistance programs. During the final class period, the nursing students verbally presented their family assessments, being careful to protect the anonymity of the families by omitting names and identifying members only by gender and age. When assessing family needs, students considered biophysical, psychological, physical, sociocultural, behavioral, and health system issues as outlined in an adapted guide from Clark's text^[9] (see Table 2). In addition, students created a genogram to visually represent each family member's gender, age, and history of illness.

Table 2. Guided Discussion Questions for Family Assessment

| Considerations | Questions |
|----------------|--|
| Biophysical | What is the age and gender of family members? Is there a family history of illness? |
| Psychological | How effective are family communication patterns? How are decisions made in the family? By whom? Who is the leader in the family? What emotional strengths exist within the family? Is there evidence of violence within the family? Is there evidence of addiction in the family? What coping strategies are utilized by family members? What is the condition of the home? |
| Physical | Are there any safety hazards in the home? How safe is the neighborhood? Does the family have access to goods and services? |
| Sociocultural | What formal and informal roles are displayed by family members? What cultural and religious factors influence family health status? Is the family income sufficient to meet the family's needs? Are family members employed? If so, what are their occupations? How is food usually prepared? By whom? |
| Behavioral | What medications or herbs are used by family members? Do family members get adequate rest and exercise? What recreation activities do family members engage in? Do family members wear safety belts (car safety seats)? Is there a need for family planning? |
| Health System | Do family members have access to the health system? How do family members deal with illness? What is the family's usual source of health care services? Does the family's use of health care services seem appropriate? |

(Adapted from Clark MJ. Community Health Nursing: Advocacy for Population Health. (5th ed.). New Jersey: Prentice Hall; 2008: 338-344).

4.3 Health teaching

The health teaching lessons were closely associated with the community interventions. Prior to each school presentation, nursing students outlined their lesson plan including topic, supplies needed, and amount of time needed. Also required was an assessment of the target audience including language, culture, age, and possible learning barriers. Nursing students needed to relate teaching topics to nursing diagnoses identified in the community assessment, as well as review their teaching strategy and outline learning activities. Finally, students outlined how they would evaluate the effectiveness of their health teaching.

4.4 Reflective writing

Incorporating written assignments where students can reflect upon their clinical experiences improves critical thinking skills while simultaneously improving students' abilities to effectively communicate ^[10]. The reflective writing assignments for the course were weekly assignments requiring the student to respond to a series of writing prompts (see Table 3). These written assignments were utilized, not only as a learning tool for students, but also to evaluate students' understanding of community nursing concepts, as well as providing culturally appropriate nursing care.

Table 3. Reflective Writing Prompts

| |
|--|
| According to the World Health Organization (WHO), 80% of the people of the world use complementary, alternative, holistic medicine for treating common illnesses. Select a common illness in the community with which you are completing clinical hours and identify three complementary, alternative, holistic approaches that people might use. |
| Reflect upon your own biases and identify one that might be a barrier to your ability to provide quality nursing care. Discuss how you can overcome this bias to provide culturally appropriate community nursing. |
| Who would most likely be the "religious expert" to grant authority or permission to make a health-related change? How would you involve this person and what specific role do you see this person assuming to accomplish a goal of improved health care access and utilization? |
| Ponder on your experiences during the family home visit this week. Are there any identifiable cultural beliefs that are preventing or hindering the family from solving their health problem? Give specific examples of cultural barriers and in the final paragraph of your paper, address what you can do as a community nurse to help the family members make a positive change while simultaneously respecting cultural beliefs. |
| When considering the role of a community nurse, please share your thoughts and perspectives, identifying what you think the best aspects and worst aspects of this type of nursing are and why. I'm interested in your honest evaluation. |
| Suppose you were talking to someone who is not familiar with your clinical site and they ask you, "But this course is called Global Health and Human Diversity in Nursing. If you are staying in the same state, how is that a global health nursing experience? Don't you need to go out of the country to have a global nursing experience?" What would your response be and why? |

5 Evaluation of student learning

Evidence of improvement in the nursing students' beliefs and perceptions of community nursing was seen in areas such as the value, need, and influence of community nurses. In the preliminary questionnaire, 50% of students agreed that community nursing is a valuable nursing specialty. In the subsequent evaluation, 71.4% of students very strongly agreed with the previous statement, an improvement of 21.4%. Initially, 62.5% of students disagreed that the most valuable nursing is offered in the community. After the community nursing experience, 42.9% of the students agreed that the most valuable nursing is offered outside acute care facilities, an improvement of 19.6%. The nursing students often reflected upon the potential influence of a community nurse in their written assignments. One student expressed:

Community nursing is probably the epitome of what nursing [is] meant to be. Nursing is focused on service and improving the health and well-being of the populace. Although I always respected community nurses, now I can more fully appreciate the work that they do. Being a community nurse has been hard, but rewarding.

Changes in students' perceptions of the influence of community nurses were also evidenced between surveys. Previous to the clinical experience, 50% of students agreed that community nurses do make a difference in the communities served. Afterwards, it was recorded that 57.1% very strongly agreed that community nurses make a difference, an improvement of 7.1%. At the conclusion of the community nursing clinical, 57.1% of students strongly agreed that they understood the community nurse role, a 19.6% improvement over the initial 37.5% of students who simply agreed that they understood the role of community nursing. In the students' reflective writing, they recognized the positive influence a community nurse can have upon the community. One student captured this theme when expressing:

I know that community health nurses have a major impact on the health and wellness of individuals worldwide.

Another student echoed this sentiment, stating:

Certainly the best aspect of being a community nurse comes from the impact that one person can have on a population. Working with groups means the community nurse has the potential to make a greater impact on numerous people.

In the open-ended question, all of the student comments reflected an enhancement of basic knowledge of community nursing, confidence level in nursing skills, and overall leadership skills. The students also agreed that community-based clinical hours were much more valuable when scheduled later in the curriculum. As one student explained:

I personally feel a lot more respect for the community health nurse's role now, more than when I was in the first semester of the nursing program and gaining my initial exposure to community health nursing. I feel this because I have become a lot more immersed in the community and I have been able to see the whole picture of their needs, as opposed to my short experience to a variety of communities in the first semester of the nursing program.

During the course, several students expressed their thoughts about the importance of cultural competence for nurses, especially community nurses. They learned that bringing about change in an entire community not only requires time commitment, it also requires: patience to understand the community's perspective, patience to identify community needs, and patience to recognize and appreciate cultural influences in the community. After describing several nursing interactions with families in the community, one student conveyed the following observation:

There is something special about forming a close relationship with an entire community and a love for their culture and what makes them unique.

6 Discussion

When examining the responses of the community nursing students enrolled in the GHHDN course, it would appear that community-based clinical hours are more valuable to students when scheduled later in the curriculum and completed in one community rather than a short series of clinical hours in various communities. It is evident that mere knowledge about community nursing does not yield the same results and perceptions as actual exposure to and involvement in community nursing spanning several weeks. An intensive clinical rotation in a community-based setting permits students to realistically view the positive and negative aspects of community nursing and to more fully understand the role of a community nurse. Such augmentation of learning allows students to identify needs in a community, to participate in program planning that addresses the needs of a community, and to evaluate the effectiveness of interventions within a community.

Furthermore, clinical experiences within the same community and spanning several weeks promotes students' understanding of relationship building with groups and individuals as well as appreciation for cultural differences within a populace. While there were several GHHDN groups that traveled abroad to immerse the students in a culture different than their own, our group traveled, every week for 5 consecutive weeks, to a local rural community for the cultural immersion experience, an experience that seemed to be successful in developing cultural awareness among students. As such, it may not be necessary to travel long distances in order to identify potential clinical opportunities for a cultural immersion nursing experience. In fact, having nursing students interact with members of a local culture may even be preferable since they will most likely encounter local members of a similar culture in their future clinical rotations and, for students who remain in the local area following graduation, in their personal nursing practice ^[8].

7 Conclusion and recommendations

The depth and breadth of nursing students' experiences during community-based practicum hours are inadequate when community nursing is placed early in the curriculum. Limited in nursing practices and skills, first year nursing students are often resigned to assist with health screenings and health fairs which is not an accurate representation of the community nurse profession. However, when community nursing is introduced later in the curriculum, nursing students are better prepared to manage the challenges of nursing an entire community.

The beliefs and perceptions of students regarding community nursing is improved upon when mentored through a community nursing practicum of 125 hours over at least 5 weeks. Ideally, all the clinical hours should take place in one community, where students can have the time to truly connect with members of the community. Accordingly, such modification in clinical hours affords students the opportunity to conduct a more thorough assessment of a population and to realize the effectiveness of their nursing interventions, thus producing a positive shift in nursing students' perceptions of community nursing.

The development of cultural competence among nursing students is an issue of utmost importance as we become more integrated as a global community. Cultural competence is a skill that is developed with time; therefore, multiple interactions with the same cultural population over several weeks are necessary to afford nursing students with opportunities to immerse themselves in the community's culture. However, it should be noted that it may not be necessary to travel long distances to immerse nursing students in a different culture as there are often local opportunities to interact with those of a different cultural background.

References

- [1] Krothe JS, Flynn B, Ray D, Goodwin S. Community development through faculty practice in a rural nurse-managed clinic. *Public Health Nursing*. 2000; 17(4): 264-272. PMID:10943774 <http://dx.doi.org/10.1046/j.1525-1446.2000.00264.x>
- [2] International Council of Nurses. Nurse Wages and their Context: Database Summary [Internet]. 2011. Available from: <http://www.icn.ch/>.
- [3] Carter KF, Fournier M, Grover S, Kiehl EM, Sims KM. Innovations in community-based nursing education. *Journal of Professional Nursing*. 2005; 21(3): 167-174. PMID:16021560 <http://dx.doi.org/10.1016/j.profnurs.2005.04.004>
- [4] Wilkes L, Cioffi, J, Harrison K., Vonu-Boriceanu O. Clients with chronic and complex conditions: Their experiences of community nursing services. *Journal of Clinical Nursing*. 2008; 17(7b): 160-168. PMID:18578792 <http://dx.doi.org/10.1111/j.1365-2702.2008.02454.x>
- [5] Ervin NE, Bickes JT, Schim SM. Environments of care: A curriculum model for preparing a new generation of nurses. *Journal of Nursing Education*. 2006; 45(2): 75-80. PMID:16496861
- [6] American Association of Colleges of Nursing. The Essentials of Baccalaureate Education for Professional Nursing Practice [Internet]. 2008. Available from: <http://www.aacn.nche.edu/education/pdf/BaccEssentials08.pdf>.
- [7] Markham T, Carney M. Public health nurses and the delivery of quality nursing care in the community. *Journal of Clinical Nursing*. 2008; 17(10): 1342-1350. PMID:17419780 <http://dx.doi.org/10.1111/j.1365-2702.2006.01894.x>
- [8] Expert Panel on Global Nursing and Health. Standards of Practice for Culturally Competent Nursing Care: Executive Summary [Internet]. 2010. Available from: http://www.tcns.org/files/Standards_of_Practice_for_Culturally_Compt_Nsg_Care-Revised_.pdf
- [9] Clark MJ. *Community Health Nursing: Advocacy for Population Health* (5th ed.). New Jersey: Prentice Hall. 2008; 338-344: 356-363.
- [10] Luthy, KE, Peterson, NE, Lassetter, JH, Callister, LC. Successfully incorporating writing across the curriculum with advanced writing in nursing. *Journal of Nursing Education*. 2009; 48(1): 54-59. PMID:19227758 <http://dx.doi.org/10.3928/01484834-20090101-07>