

# Teaching wound care to family medicine residents on a wound care service

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**Abstract:** Primary care physicians often care for patients with chronic wounds, and they can best serve patients if they have knowledge and proficient skills in chronic wound care, including sharp debridement. The Oakwood Annapolis Family Medicine Residency in Michigan, USA developed a Wound Care Service, incorporating wound care training during the surgical rotation. Effectiveness of the wound care training was evaluated through pre- and posttesting of residents, to assess changes in knowledge and comfort in treating chronic wounds. The results demonstrate significant improvement in residents' knowledge and comfort in wound care. This innovation demonstrates the feasibility of educating residents in chronic wound care through hands-on experience.

**Keywords:** wound care education, primary care, residency education, surgery rotation, curriculum development

## Background

Chronic wound care poses a significant burden to patients and society. Chronic wound care expenditures total \$25 billion annually in the United States, and the burden continues to grow rapidly due to increasing health care costs, an aging population, and a sharp rise in incidence of diabetes and obesity.<sup>1</sup> For purposes of this discussion, experts define a wound as “a disruption of normal anatomic structure and function.”<sup>2</sup> In contrast to acute wounds, chronic wounds are characterized as “having failed to proceed through an orderly and timely process to produce anatomic and functional integrity, or proceeded through the repair process without establishing a sustained anatomic and functional result.”<sup>2</sup> Healing is affected by a host of factors, such as infection, inflammation, angiogenesis, regeneration of the connective tissue matrix, contraction, resurfacing, differentiation, and remodeling,<sup>2</sup> all of which are affected by chronic health care problems, such as diabetes, obesity, and aging. For example, obesity and hyperglycemia disrupt the repair process by causing changes in disposition of collagen.<sup>3</sup>

Chronic wound care requires a team approach involving nutrition, control of hyperglycemia and infection, nursing care, appropriate dressing changes, and surgical debridement. Primary care physicians are often responsible to coordinate such care when a comprehensive wound care center is not available. In practice, nurses often perform wound care in large medical centers and during home visits, under the supervision of primary care physicians, after hospital discharge. Comprehensive chronic wound care management involves timely sharp debridement and control of infection, skills family physicians could provide if trained – since many routinely perform office-based skin procedures, it is logical to include such care. Currently, the Accreditation Council for

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Graduate Medical Education (ACGME) does not require chronic wound care education training and not surprisingly, few family medicine residency programs provide specific wound care teaching for their residents.<sup>4</sup>

Despite the potential role for primary care physicians to manage chronic wounds, very few publications exist about education on chronic wound care,<sup>5-7</sup> and these primarily focus on prevention and knowledge on staging of pressure ulcers rather than treatment. Challenges in wound care education also include guidelines that are based on small studies, indirect evidence, or expert opinion.<sup>7-10</sup> Release of numerous new wound care products and research studies by the product manufacturers<sup>11,12</sup> makes it difficult for primary care physicians to discern the most effective products based on the available literature. Finally, training in chronic wound care, including surgical debridement, requires hands-on teaching by clinicians proficient in these procedures. Unfortunately, in the experience of the authors, wound care specialists such as physical therapists or registered nurses, are not trained to provide surgical debridement and are reluctant to teach physicians, including family medicine residents. Surgical intervention needs to be taught by surgeons or other physicians who are skilled in these procedures.

Given the limited literature and lack of examples of chronic wound care teaching, the purpose of this report is to describe our experience in developing a chronic wound care training program in a family medicine residency. Specifically, we developed an educational program to train family medicine residents at Oakwood Annapolis Hospital, a 259-bed hospital that hosts a family medicine residency program in Michigan, a state in the midwestern United States. Like many community hospitals, a wound care team was not available at this hospital, and family medicine residents were not previously receiving training in chronic wound care management.

## Program description

The impetus for developing the wound care service in the Oakwood Annapolis residency program came from one of us (SL), a resident at the time, who trained previously in plastic surgery; a faculty member and double-board certified physician in family medicine and vascular surgery (SM); and the program director, who trained as a family physician and geriatrician (MW). Two additional faculty members attended a wound care education program for certification in wound care as the service grew.<sup>13</sup> Offered by the Wound Care Education Institute® (WCEI) (Plainfield, IL, USA) (<http://www.wcei.net>), this 5-day course provides clinicians who treat wounds with evidence-based education on pathophysiology,

diagnosis, and treatment of acute and chronic wounds in the class room, followed by a written examination for Wound Care Certification. Educational materials for evidence-based wound care for the resident education were obtained through WCEI as well.<sup>13</sup>

The goals of the Oakwood family medicine residency Wound Care Service are for residents to: learn how to take a history for pertinent information; document the wound condition appropriately and accurately; make a correct diagnosis; and formulate plans, such as control of risk factors, control of infection, and topical treatment, including surgical debridement, choosing the appropriate dressing materials, and pressure relief.

The residency program accepts ten new residents every year, and a total of 30 residents serve in the residency program. We developed the Wound Care Service as part of the surgery rotation. Residents rotate in surgery for 2 months. One or two residents rotate in surgery each month, and the program was designed for them to take responsibility for the Wound Care Service consults during that month. Consults involve evaluating and treating patients under the direct supervision of a wound care-proficient family medicine attending physician. Working as consultants, twice per week the attending physician and residents evaluate patients referred to the Wound Care Service during their hospitalization.

The service scope of care includes nonhealing wounds, such as leg ulcers and pressure ulcers. Based on existing guidelines,<sup>14-16</sup> we developed a template for the initial assessment (Appendix S1) and progress notes (Appendix S2), to ensure that necessary details are documented consistently.

## Evaluation of effectiveness

To evaluate the curriculum, we monitored the number of consults per month, follow-up visits, and procedures performed by Wound Care Service residents in the first year of the program. Using a pre- and postintervention design, we also surveyed residents on their knowledge about treating chronic wounds (25 multiple-choice questions) and level of comfort (14 questions) before and after their rotation on the service. The knowledge test was based on the board examination for Wound Care Certification of the WCEI, and the level of comfort questions were designed by one of the authors (SL) to address four domains: (1) making the proper diagnosis and staging of pressure ulcers; (2) evaluating for infection in chronic wounds; (3) determining if there is an indication for surgical debridement; as well as (4) performing surgical debridement (Appendix S3). Scores on the survey

from before and after the intervention were compared using one-tailed and paired Student's *t*-test.

## Results

Based on discharge dictation review and hospital census data, the Wound Care Service provided 36 consultations in the inaugural year 2007. Of these, 29 patients suffered from pressure ulcers, six had leg ulcers, and one had a hip abscess. Causes of the six leg ulcers were: venous stasis (three patients), arterial insufficiency (one patient), diabetic foot ulcer (one patient), and unknown (one patient). The mean time from admission until consultation was 5.8 days and from initial consultation until discharge was 8.2 days. All the pressure ulcers seen were stage 2 or higher.

During the first 12 months of the service, eleven of 14 residents rotating in surgery participated in the new service and provided care for a mean of 5.5 patients. Four residents felt they had enough exposure, six wished they had more volume, and one did not want to learn about wound care. Nine would have liked time with another wound care specialist, and six requested more lectures, resources, or guidelines on wound care.

Residents' ( $n = 8$ ) scores on the knowledge test improved from a mean of 42.5% to 62.4% from before to after the rotation ( $P < 0.05$ ) (Table 1). Moreover, residents' ( $n = 5$ ) reported level of comfort improved from 3.2 to 1.9 on a scale of 1–5 (where 1 represented most confident and 5 represented least confident). This self-reported improvement achieves statistical significance using the paired Student's *t*-test.

Based on the study and feedback from residents and attending physicians in the inaugural year in 2007, the education during the rotation was improved by refining the teaching on wounds and evaluation of the residents by the attending physician.

## Discussion

This report illustrates the feasibility of including wound care teaching through incorporation of a Wound Care Service into

family medicine resident training. We specifically integrated the training into the family medicine resident's surgery rotation. According to the ACGME, the purpose of the surgical rotation is to achieve competency in the diagnosis and management of surgical disorders and emergencies.<sup>4</sup> It has long been argued which minor surgical procedures are particularly appropriate during the surgical rotation,<sup>17</sup> and which procedures should be performed by family physicians, as practice varies widely.<sup>18</sup> The Society of Teachers of Family Medicine developed the list of core procedures<sup>19</sup> and advanced procedures for family physicians in 2009;<sup>20</sup> however, sharp surgical debridement or chronic wound care was not included in this list. Chronic wound care requires knowledge in diagnosis, risk factors, and treatment, including wound dressing products as well as ability to perform debridement, which may be not be classified as a skin procedure. Experience in the Wound Care Service provided a new approach for teaching residents how to evaluate and treat chronic wounds. Residents were also involved in teaching nurses about prevention of pressure ulcers. Most residents who participated in this service judged the training as beneficial, though many wanted more patients and more lectures. Residents' knowledge and comfort scores improved statistically and meaningfully. The Wound Care Service also improved the revenue of the family physicians, as wound care consults were billed as hospital consults with high complexity, and debridement billed separately as a procedure, dependent on the depth and size of the debridement.<sup>21</sup>

Ury et al divide the curriculum development process into four phases: needs assessment, curriculum design, implementation, and evaluation.<sup>22</sup> In this study, these elements came together. A particularly important factor in program development and then the challenge of sustainability is having an institutional "champion." The ability and motivation of the teaching physicians (SSM, MW), our institutional champions, to provide wound care proved to be a critical element for success of the program. It is shown that adding a new agenda into residency training program requires support from the program,<sup>23</sup> duplicating this experience in

**Table 1** Knowledge and comfort with managing chronic wounds before and after the chronic wound rotation

	Category	Pretest mean (%)	Posttest mean (%)	P (one-tailed)	P (paired)
Knowledge ( $n = 8$ )	Leg ulcers	43	43	0.5	1
	Pressure ulcers	33	73	0.002	0.0058
	General wound care	49	71	0.031	0.063
	Total	42	62	0.011	0.021
	<b>Score scale</b>	<b>Pretest mean*</b>	<b>Posttest mean</b>	<b>P (one-tailed)</b>	<b>P (paired)</b>
Level of comfort <sup>^</sup> ( $n = 5$ )	1–5	3.2	1.9	0.006	0.011

**Notes:** \*Scores for prerotation and postrotation were compared by unpaired Student's *t*-test (one-tailed) and paired Student's *t*-test (paired); <sup>^</sup>scored on a five-point scale, where 1 was very comfortable and 5 was very uncomfortable.

other residency training programs will also likely require at least one physician initially who is motivated to provide the clinical teaching and supervision needed.<sup>23</sup>

Our program was supported strongly by the hospital, a critical element for new program success,<sup>21</sup> because the hospital did not have a wound care service, and the needed service was provided by the residency with qualified teaching physicians (SSM, MW). For residency programs starting wound care education in the future – depending on the available resources – residents could learn the skills from surgeons who take care of chronic wounds, by rotating in a wound care clinic or from an existing wound care service in the hospital. Ideally, residents should be able to learn surgical debridement as it is widely practiced and believed to be effective, although there currently is not enough evidence to show which method of debridement is the best.<sup>9</sup>

The knowledge and skills taught during chronic wound care service could be helpful for many patients that resident physicians will see in their careers after graduation. Though chronic wound management is not required training for family medicine residents,<sup>4,19</sup> chronic wounds occur commonly, especially among geriatric patients staying in hospitals and nursing homes or who receive home care.<sup>24</sup> Kovner et al argue that all members of the workforce should have training in geriatrics appropriate to the scope of their work.<sup>25</sup> Since the geriatric population is growing<sup>26</sup> and primary care physicians, such as family physicians and internists, provide care for geriatric patients who disproportionately develop chronic wounds, competence in wound care treatment represents a substantive “added value” experience during residency training. Primary care physicians having skills in chronic wound care and surgical debridement can provide a particularly pertinent service in community settings lacking wound care centers or surgeons to care for chronic wounds.<sup>27</sup>

Our program added limited experiences of wound care during the surgical rotation, and according to our observation, some family medicine residency programs provide more wound care education during the surgical rotation. Residents can also have further experiences by doing a rotation in a wound care center. If a 4-year family medicine residency program were to be approved, the resident may have more time to spend on wound care education in the future.

This study has several limitations typical of research in medical education.<sup>28</sup> First, the instruments used in the study have not been validated. Second, the number of subjects were small ( $n = 8$ ) due to the nature of the study. Third, teaching was done during patient care, through one-on-one

teaching – this made it difficult to monitor the content and quality of the teaching. Finally, we were unable to produce outcomes data for this educational intervention, though in the future, use of a (surgical) objective structured clinical examination (OSCE)<sup>29</sup> using a pre- and postexposure design is possible.

The Wound Care Service in the residency program lasted for 4 years and produced two graduating residents who continued to provide wound care after graduation. After the physicians who initiated the program (SSM, MW) left the residency, the on-call burden for the remaining two qualified service attending physicians became excessive. Consequently, the wound care service was transitioned to wound care nurses (H Ali, personal communication, March 6, 2013). For sustainability of a wound care service, this point highlights the need to have a strong advocate for the program and sufficient attending coverage.

## Conclusion

This report illustrates that a specific curriculum for resident education in chronic wound management including sharp debridement is feasible and practical. With minimal resources, a similar service could be implemented in many family medicine and primary care residency programs. With respect to sustainability, challenges will be the competing demands of other training agendas as well as the sufficient availability of attending physicians who can perform comprehensive wound care. Such a service may be particularly useful in programs with a large geriatric population. In hospitals with experienced wound care nurses and/or teams, the opportunity to work collaboratively with the existing service could enhance family medicine residents' competence in chronic wound management.

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## Disclosure

The authors report no conflict of interests in this work.

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## Supplementary materials

### Appendix SI Wound evaluation form – initial encounter

**PCP:**
**Date of service:**
**Site:**
**CC:** Wound at

**HPI:**
**Activity:** ambulation (walk independently, with walker, with help, unable to walk)

**Sensation:** (normal, painful, paresthesias, decreased sensation, no sensation)

**Current living status:** (hospital, sub-acute rehab, nursing home, home)

**Care:** by (self, family, home health, nursing staffs, physical therapy)

**Incontinence:** (yes, no) (stool, urine, both)

**Current treatment for the wound:**
**Current health problems:**
**PMH:**
**PSH:**
**Current medications:**
**Allergies:**
**PE:** Ht:      Wt:      T:      BP:      HR:      RR:

**Description of the wound:**

Location: (L R, Bilat) (foot, leg, arm, sacrum, ischium, lateral trochanter) (medial, lateral), Other:

Duration of wound:      Color of the wound:

Color of the skin around the wound:      Pigmentation: (+, –)

Odor: (+, –)

Discharge: nature (serous, purulent, bloody), amount (little, moderate, copious)

Size:      Edema: (+, –)

Granulation:      Pocket formation: (+, –) (      cm deep)

Necrotic tissue: (      %,      cm at the edge)      Foot pulses for foot ulcers:

Labs:

**Drawing:**
**General:**

HEENT:      CV:

Neck:      Abdomen:

Chest:      Extremities:

Physical pressure: (yes, no, unsure)      Arterial insufficiency: (yes, no, unsure)

Venous insufficiency: (yes, no, unsure)      Neuropathy: (yes, no)

Nutrition: (adequate, moderate, poor)      Infections: (yes, no, unsure)

Foreign body: (+, –, unsure)

Deep infection: (+, –) (cellulitis, abscess, osteomyelitis)

Other factors: (radiation, steroid use, antimetabolites, immunosuppressant, other      )

**Assessment:**
**Plan:**

Follow-up in      (days, weeks, months) with

Resident signature \_\_\_\_\_ date / /      Attending signature \_\_\_\_\_ date / /

**Abbreviations:** Bilat, bilateral; BP, blood pressure; CC, Chief Complaint; CV, Cardiovascular; HEENT, Head, eye, ear, nose and throat; DX, diagnosis; HPI, history of present illness; HR, heart rate; Ht, height; Hx, history; L, left; PCP, primary care physician; PE, physical exam; PMH, past medical history; PSH, past surgical history R, right; RR, respiratory rate; T, temperature; Wt, weight.

**Appendix S2** Wound evaluation form – progress note**PCP:****Date of service:****Resident/Attending:****Site:****DX:****Interval Hx:****Current treatment for the wound:****Change in the wound:****Drawing:****New study:****Assessment:** (resolved, improved, stable, worse)**Treatment plan:** Continue the current treatment? (yes, no)

Change in the treatment plan –

Follow-up in: (days, weeks, months) with

Resident signature: \_\_\_\_\_ date / / Attending signature: \_\_\_\_\_ / /

**Abbreviations:** DX, diagnosis; Hx, history; PCP, primary care physician.**Appendix S3** Survey of residents on wound care

Name of the resident:

Postgraduate year:

Before / After Surgery rotation # 1 / # 2 with/without wound care involvement

Please put 1–5 for each question. 1-very true, 2-mostly true, 3-neutral, 4-mostly untrue, 5-very untrue.

- Q1. When my patient in the nursing home develops a pressure sore, I am comfortable in treating it unless it is surgical candidate.
- Q2. When my patient in the nursing home develops an ulcer in a foot, I know how to diagnose the cause of the ulcer.
- Q3. I am comfortable in doing bedside debridement.
- Q4. I would do debridement if I see necrotic tissue every week.
- Q5. I can choose a right dressing for the wound and give nurses directions how to use them.
- Q6. I can treat wounds better than a surgeon unless the patient needs surgery, as I can coordinate health condition, nutrition, and psychosocial issues.
- Q7. I can choose correct level of compression to the particular leg ulcer.
- Q8. I know the stages of pressure ulcer.
- Q9. I know what dressing to use for ulcer with moderate amount of necrotic tissue.
- Q10. I know surgical indications for a non-healing ulcer.
- Q11. I can differentiate wound infection and wound contamination.
- Q12. I know the treatment for each stage of pressure ulcer.
- Q13. I know the measures to prevent pressure ulcers.
- Q14. I know what dressing to use for infected ulcers.

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