**Project Lead**  
Matt White, MD (PGY1)

**Title**  
Diabetic Foot Care

**Team**  
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**Change**  
Assess adherence to new Diabetic Foot Care Algorithm

**Cycle #**  
4

**Key Words**  
Diabetes, foot care, screening

**BACKGROUND:**
Cycle 1 summarized the UNC Internal Medicine diabetic foot care program and developed criteria which place diabetic patients at high risk for foot complications. 65% were determined to be high risk (vs. only low risk), but this data was not evident to nurses/providers at the time of a patient visit.

In cycle 2, draft yellow sheets were developed to notify the nurses/providers the severity of the patient’s foot risk and to trigger actions including visual inspections and comprehensive exams when indicated. In addition an algorithm was developed to prompt interventions based on visual/comprehensive inspection findings.

In cycle 3, more detailed risk stratification was created to assess patient’s foot risk as low, intermediate, or high using the International Working Group on the Diabetic Foot (IWGDF). Foot interventions were further specified based on each risk assessment. Nurses also began asking patients about their comorbidities as well as their use of diabetic shoes and if prescriptions had been given in the past. Providers were asked if diabetic shoes were prescribed or if a referral was made to podiatry.

Recent literature has shown that only 23-49% of diabetics have feet evaluated yearly in primary care setting [1]. Another study found that only 14% of diabetics hospitalized for foot infection receive rudimentary lower extremity exam [2]. With the amputation rate of diabetics being approximately 3.7-12.5 per 1000 diabetic patients the need for appropriate foot care for diabetic patients is essential. Risk stratification and focused foot care has been shown to reduce amputations, foot related hospital admissions, and foot related length of stays [1].

**References:**
**PLAN:**

**Aim/Objective Statement:**
The goal of cycle 4 is to assess the adherence to the new diabetic foot care plan (exams and interventions) and determine barriers to compliance with the newly created algorithm now that the modified yellow sheets are in place.

Specific questions to address in this cycle:
1. What percentage of comorbidity questions is asked when indicated?
2. What percentage of “high risk” patients are asked diabetic shoe questions?
3. What percentage of visual inspections (by nurses)/comprehensive exams (by provider) is performed when indicated?
4. What percentage of “high risk” patients not previously prescribed diabetic shoes are given prescriptions for diabetic shoes?

**Predictions/Hypotheses:**
With new changes to the yellow sheets creating better risk stratification and more appropriate interventions, diabetic patients will receive improved foot care. However, since these interventions are new, it is anticipated that adherence to the new algorithms will be low, especially among providers who have not had training sessions yet.

**Plan for change/test/intervention:**
Who: Internal medicine providers and nurses
What: Assess current adherence rates to new diabetic foot algorithm
When: September-October 2008
Where: UNC IM clinic
How: Assessment of adherence to new Internal Medicine Diabetic Foot Care Algorithm and identify barriers to increased adherence.

**Measures:**
**Plan for data collection**
Who: Matt and diabetes care volunteers
What: percentage of comorbidity questions asked, percentage of diabetic shoe questions asked to high risk patients, percentage of visual inspections/comprehensive exams performed, percentage of diabetic shoe prescriptions given when indicated.
When: September-October 2008
Where: UNC IM clinic
How: Data will be collected manually from yellow sheet encounter forms to determine initial adherence rates. Shaun McDonald is currently working to automate this process.

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**DO:** Carry out the change/test. Collect data.
A nursing training session was held by Dr. Alemán on 9/18/08 to update them on the new changes to the yellow sheet. The updated yellow sheets were introduced on 9/22/08 which stratified patients into low, intermediate, and high foot risk categories. The new sheets also
included new screening questions about diabetic shoes. Many of the nurses and some of the attendings were updated on the yellow sheets during the All Hands meeting held on 9/25/08.

Data was tracked from the yellow sheets for three consecutive weeks and tallied. Initially, the main problems encountered were exams not being performed when indicated and nurses recording exam findings when the exam indicated was actually by a provider.

Several problems were encountered with the yellow sheets and some minor edits were made to the yellow sheets to make wording of tasks more clear and to have all tasks that required attention to be bolded.

The clinic attendings received an email regarding these additional changes on 10/8/08 and the residents received email notification on 10/9/08.

To aid in future project work, we developed a key driver diagram for diabetic foot care in our clinic. See attachment at the end of this document.

**STUDY:** Summarize and Analyze data (quantitative and qualitative). Include charts, graphs.

<table>
<thead>
<tr>
<th>Week</th>
<th>Comorbidity ?s</th>
<th>Diabetic Shoe ?s</th>
<th>Goal</th>
<th>% Nurse Complete</th>
<th>% Provider Complete</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/23/2008</td>
<td>39</td>
<td>41</td>
<td>95%</td>
<td>26</td>
<td>27</td>
<td>96%</td>
</tr>
<tr>
<td>9/29/2008</td>
<td>36</td>
<td>38</td>
<td>95%</td>
<td>8</td>
<td>12</td>
<td>67%</td>
</tr>
<tr>
<td>10/5/2008</td>
<td>23</td>
<td>25</td>
<td>92%</td>
<td>15</td>
<td>21</td>
<td>71%</td>
</tr>
</tbody>
</table>

**Percent Nursing Questions Complete**

- Comorbidity ?s
- Diabetic Shoe ?s
- Goal

**Percent Foot Exams Complete**

- % Nurse Complete
- % Provider Complete
- Goal

<table>
<thead>
<tr>
<th>Week</th>
<th>% Nurse Complete</th>
<th>% Provider Complete</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/23/2008</td>
<td>10</td>
<td>35</td>
<td>29%</td>
</tr>
<tr>
<td>9/29/2008</td>
<td>14</td>
<td>32</td>
<td>44%</td>
</tr>
<tr>
<td>10/5/2008</td>
<td>25</td>
<td>38</td>
<td>66%</td>
</tr>
</tbody>
</table>

**Percent Nursing Questions Complete**

- Comorbidity ?s
- Goal
- Diabetic Shoe ?s

**Percent Foot Exams Complete**

- % Provider Complete
- Goal
- Percent Nurse Complete
In addition, we found that 12/48 (25%) of high risk patients were wearing diabetic shoes and 8/48 (17%) were not wearing shoes, but had been given a prescription in the past. Three patients were referred to podiatry and three patients were flagged as already being followed by podiatry during our three weeks of observation. Many providers did not answer this questions; however, so no definite conclusions can be made from this piece of data.

The diabetes database was queried to determine the number of patients that would fit into the IWGDF groups after recent changes to the yellow sheet.

<table>
<thead>
<tr>
<th>Condition</th>
<th># Pts with</th>
<th>Total Pts</th>
<th>%With Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monofilament &lt;6/8 and/or peripheral neuropathy (PN)</td>
<td>753</td>
<td>1655</td>
<td>45%</td>
</tr>
<tr>
<td>Monofilament &lt;6/8/PN AND PVD and/or foot deformity</td>
<td>176</td>
<td>1419</td>
<td>12%</td>
</tr>
<tr>
<td>H/O Amputation or h/o foot ulcer</td>
<td>181</td>
<td>1487</td>
<td>12%</td>
</tr>
</tbody>
</table>

An update risk stratification of the UNC IM DM patients is shown below:

<table>
<thead>
<tr>
<th>Risk Category</th>
<th># Pts</th>
<th>Total Pts</th>
<th>% per Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>227</td>
<td>1793</td>
<td>13%</td>
</tr>
<tr>
<td>Intermediate</td>
<td>571</td>
<td>1793</td>
<td>32%</td>
</tr>
<tr>
<td>Low</td>
<td>995</td>
<td>1793</td>
<td>55%</td>
</tr>
</tbody>
</table>

**ACT:** Document/summarize what was learned.

1. **Yellow sheets now easier to use** and it is more clear to nurses/providers regarding which exams should be performed for different risk patients.
2. The percentage of nursing-performed exams is close to goal after receiving a training session by Dr. Alemán and update on the yellow sheet at the All Hands meeting.
3. **Providers will require training** to use new yellow sheets and reach goal of completing 80% of comprehensive foot exams.
4. **Several barriers to compliance were identified** such as time constraints of the visit or patients refusing exams; however, the biggest barriers were lack of education about the new foot care algorithm (particularly by residents) or failing to fill out the yellow sheet.

**Define next steps.** Are you confident that you should expand size/scope of test or implement? What changes are needed for the next cycle?

1. The **pre-clinic conference** of the week of 10/27 will focus on diabetic foot care and will serve to educate residents on the new yellow sheets and new foot care algorithms. By educating the residents at pre-clinic conference and updating the attendings at an upcoming division meeting the number of foot exams performed will almost certainly increase.
2. The yellow sheets will continue to be modified to make them easier to use for nurses and providers. Formatting the sheets so all the foot care data, including exam findings, are on the front of the sheet would make it easier to use and less likely to be skipped. In order to fit all the data on the front of the sheet, it may be necessary to prioritize the exams or screenings that should be performed at that particular visit.

3. Communication also needs to be improved between nurses and providers regarding foot exams. It is currently unclear if patients with normal visual inspections by the nurse should keep their socks and shoes off until the provider has evaluated the patient or if the patients should put their socks and shoes back on to “signal” that their exam was normal and now intervention is needed from the provider.

4. Utilizing pre-printed diabetic shoe prescriptions should help increase the number of prescriptions being given to high risk diabetic patients. The pre-printed prescriptions as well as self-care sheets, for self home foot care, will be available to the nurses and will be able to be given to the patient before they are evaluated by the provider. Also, tracking previous prescriptions for diabetic shoes/inserts based on the following HCPCS codes will identify patients that have previously received shoes or inserts.

Medicare or Medicaid patients:
Shoe A5500 (allowed 1 pair per calendar year)
Inserts A5513 (allow 3 pair per calendar year)

Non Medicare or non Medicaid (self pay, private insurance, etc):
Shoe Men L3221
Show Women L3216
Insert Regular L3010
Insert custom L3020

5. The algorithm for dealing with the abnormal exam findings will also need to be formalized. Several IM clinic nurses may be trained on basic care of diabetic ulcers and the process of referring patients to podiatry/vascular surgery will need more evaluation.

6. Develop method have the database automatically calculate percentage of exams completed by nurses and providers. This will eliminate the need to manually tally yellow sheets and allow us to easily track progress over time.
Attachment 1:
Diabetic Foot Care Key Driver Analysis

Improve diabetic foot care by:
- improving monitoring of feet
- identifying and intervening when complications do arise
- utilizing resources to prevent complications

Outcomes
Key Drivers
Interventions

Clinical Decision Support
- Identify foot risk for individual patients. Allows identification of patients at highest risk.
- Prompt provider and staff to perform appropriate exam at needed interval.

Use of Diabetic Footwear
- Ensure that patients at high risk for foot complication are prescribed and wear diabetic shoes.

Self-Management Support
- Develop low literacy handout for patients describing appropriate self-care of feet
- Train staff to educate patients

Appropriate internal follow-up for complications
- Good communication between nurses and providers.
- Clear recommendations when abnormal exam findings.

Appropriate external follow-up for complications
- Ensure appropriate patients receive referrals to podiatry and vascular surgery.
- Ensure that staff has contacts in podiatry and vascular surgery for urgent care

Measures of Success:
- 80% of nursing visual exams and provider comprehensive foot exams performed when indicated
- 90% of patients will be up to date on foot exams
- 50% of high risk patients never prescribed DM shoes will be given Rx for shoes
- x% of patients will receive basic education about self foot care

Interventions
- Based on literature, develop strategy to stratify patients automatically.
- Alert nurses/providers to risk and prompt exams (monofilament, visual inspection or comprehensive exam) when indicated.
- Develop patient screening questions to better stratify their risk.
- Develop comprehensive foot care algorithm to aid providers.

- Train nurses on foot care changes and proper foot exam technique.
- Increase provider awareness by introducing yellow sheet changes.
- Track/report exam performance data and assessment of screening questions.
- Need to develop tracking/reporting of interventions.

- Develop patient-focused handout in future to further educate patients about self foot care. Nurse-directed intervention.

- Develop a foot care program in UNC Internal Medicine to handle non-urgent issues and patients who cannot be seen in podiatry. (Two IM clinic nurses have had some training from Wound Care Clinic.)

- Begin tracking referrals to podiatry. Remain aware of patients who cannot be seen by podiatry due to insurance status.