



Advanced Wound Care Assessment: Improving Diabetic Foot Ulcer Outcomes



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Purpose

- Increase the Use of PVR with ABI in the assessment of diabetic foot ulcers in a local advanced wound care clinic

Background

- Diabetes is a major disorder that affects more than 220 million people world-wide each year.
- Diabetes affects all aspects of a patient's life and has physical, emotional and financial implications for patients, families, and the community at large.
- Diabetes accounts for over 20% of hospital admissions; the projected cost of diabetes associated treatment and lost productivity in the US in 2012 was \$245 billion.
- Diabetic foot ulcers affect one in four persons with diabetes and results in amputation for six in 1,000 persons

Existing Gaps

- Assessment and recognition of diabetic foot ulcers in patients is often not timely – leading to:
 - later stage ulcer development
 - a need for more complex treatment planning
- risk for complications
- increased cost
- decreased health & wellness
- reduced quality of life

Enhancing Assessment for DFU

- Traditionally, vascular assessment of diabetic foot ulcers is done via verification of presence of pedal pulse
- Proper assessment for diabetic ulcers should include:
 - Comprehensive pedal pulse assessment (hx, rate, rhyme, amplitude, wave form, thrills/vibration, and capillary response; as well as color of foot, temperature and presence of deformity)
 - Pulse Volume Recording (PVR) with Ankle Brachial Index (ABI)
- Available evidence is strong and compelling

Clinical Question Proposed Solution

- Does the implementation of a comprehensive education program increase the use of PVR with ABI as a screening tool in diabetic patients aged 40 to 60 with diabetic foot ulcers who receive care from a local advanced wound healing and hyperbaric medicine practice group?
- A comprehensive education program will improve PVR with ABI use by a minimum of 20%

Impact on Providers

Table 1: PROVIDER DEMOGRAPHICS

	All Providers (N=14)	MD/DO (N=4)	ARNP (N=1)	RN (N=7)	Technician (N=2)
Age					
< 25	-	-	-	-	-
26-40	35.7	25	-	57.1	-
41-55	42.9	50	100	28.6	50
56+	21.4	25	-	14.3	50
Has Provider Received Additional Credentialing?					
yes	35.7	75	100	-	50
no	64.3	25	-	100	50
Worked at Clinic for 6+ Months					
yes	100	100	100	100	100
no	-	-	-	-	-

Table 2: POST TRAINING PROVIDER FEEDBACK

REACTION TO TRAINING	All Providers (N=14)	Likert Scale					Mean	SD	Range
		1	2	3	4	5			
I found the training to be engaging									
I found the training to be relevant to my job as a health care provider									
I gained theoretical knowledge I did not previously have about the importance of PVR with ABI in the assessment of diabetic foot ulcers as a result of participation in this workshop									
I have improved my understanding of why PVR with ABI is an important component of diabetic foot ulcer assessment as a result of participation in this workshop									
I feel confident that I could explain the importance of PVR with ABI in the assessment of diabetic foot ulcers to healthcare providers and patients									
As a result of my participation in this workshop, my use of PVR with ABI in the assessment of diabetic foot ulcers will increase									
As a result of my participation in this workshop, I will recommend the use of PVR with ABI in the assessment of diabetic foot ulcers to other health care providers									
In the future, I will always utilize PVR with ABI in the assessment of patients with stage 2 or 3 diabetic foot ulcers**									

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The Intervention

- 2 one-hour education sessions focusing on :
 - Prevalence and impact of diabetic foot ulcers
 - Importance of PVR with ABI
 - Conduct of proper comprehensive pedal pulse/foot exam (discussion & practice)
 - Conduct and Interpretation of PVR with ABI (discussion & practice)
 - Brief comprehension assessment
- Target physicians and health care extenders including nurses and nurse practitioners

Impact on Practice

Table 3: Pre and Post Training Patient Outcomes*

PATIENT DEMOGRAPHICS	Pre-Training Cases (N=30)	Post-Training Cases (N=30)	Significant Differences**
Mean Age (±SD)	54.8(±5.78)	55.8(±6.04)	-
Diabetes	100%	100%	-
Most Common Co-Morbid Conditions			
Diabetes	100%	100%	-
Hypertension	90%	90%	-
Chronic Obstructive Pulmonary Disease	40%	30%	-
Chronic Kidney Disease	23%	16%	-
Deep Vein Thrombosis	10%	3%	-
Peripheral Artery Disease	90%	65%	-
ASSESSMENT STRATEGIES			
Presence of Manual Foot Exam	96.7%	100%	-
Outcomes of Manual Foot Exam			
Pulse Present	65.0%	63.3%	-
Quality	34.5%	36.7%	-
Weak or Thready	17.2%	23.3%	-
Presence of PVR with ABI	26.7%	77%	P<.001
Outcomes of PVR with ABI			
Grade 0	0	66.7%	-
Grade 1	6.7%	6.7%	-
Grade 2	13.3%	6.7%	-
Grade 3	6.7%	6.7%	-
Grade 4	7.3%	23.3%	P<.010
Grade 5	0	0	-
non-applicable (did not have PVR with ABI)	73.3%	73.3%	-
WOUND TREATMENT			
Timeliness of Care	48.3(±54.6)	67.5(±52.0)	-
Days Elapsed Between Ulcer Start and Treatment Onset			
Use of Hyperbaric Oxygen Therapy	43.3%	56.7%	-
Number of Sessions – Avg (±SD)	37.6(±24.5)	32.2(±21.1)	-
Frequency of HBO Treatment	100%	100%	-
TREATMENT OUTCOMES			
Wagner Grade of Diabetic Foot Ulcer			
Grade 0	0	0	-
Grade 1	0	0	-
Grade 2	33.3%	33.3%	-
Grade 3	33.3%	33.3%	-
Grade 4	0	0	-
Grade 5	0	0	-
Diabetic Foot Ulcer Volume	1.43(±2.49)	0.91(±1.27)	-
30 Days After Treatment Start			
Wagner Grade of Diabetic Foot Ulcer			
Grade 0	7.7%	10.3%	-
Grade 1	13.3%	20.0%	-
Grade 2	34.6%	27.0%	-
Grade 3	38.5%	34.0%	-
Grade 4	7.7%	6.9%	-
Grade 5	0	0	-
Change in Diabetic Foot Ulcer Volume – start to 30 days	1.01(±1.98)	1.01(±2.2)	-
Loss To 30 Day Follow up	-0.43(±1.28)	-	-
60 Days After Treatment Start			
Wagner Grade of Diabetic Foot Ulcer			
Grade 0	23.8%	27.3%	-
Grade 1	3.7%	3.0%	-
Grade 2	38.1%	36.4%	-
Grade 3	23.8%	18.2%	-
Grade 4	6.9%	6.9%	-
Grade 5	0	0	-
Change in Diabetic Foot Ulcer Volume – start to 60 days	2.24(±5.5)	0.78(±1.8)	P<.010
Loss To 60 Day Follow up	-0.27(±1.2)	-0.27(±1.3)	P<.010
90 Days After Treatment Start			
Wagner Grade of Diabetic Foot Ulcer			
Grade 0	36.8%	40.9%	-
Grade 1	5.3%	5.3%	-
Grade 2	28.2%	9.1%	-
Grade 3	0	0	-
Grade 4	0	0	-
Grade 5	0	0	-
Change in Diabetic Foot Ulcer Volume – start to 90 days	1.36(±4.73)	0.16(±3.2)	P<.010
Loss To 90 Day Follow up	-0.27(±1.38)	-0.27(±1.3)	P<.010
Amputation	16.7(±6)	6.7(±6)	-
Referred to Another Health Facility and/or Provider	16.7(±6)	16.7(±6)	-
3.3(±1)	3.3(±1)	-	

PVR with ABI increased from 26% to 77% pre-post training; this aligns with reported intentions to use PVR with ABI post training

15.5% reduction in wound volume and 50% fewer amputations at 60 days in the post training period

84% reduction in wound volume and 60% fewer amputations at 90 days in the post training period

Project Design

- Pre-test/Post-test Model
 - 90 day retrospective analysis (via records review) of assessment and treatment plans for patients aged 40 to 60 with diabetic foot ulcers who received care at a local, advanced wound care center prior to project implementation
 - Delivery of a comprehensive education program to providers and selected clinical staff August 2016
 - 90 day prospective data collection & analysis (via records review) of assessment and treatment plans for patients aged 40 to with diabetic foot ulcers who received care at a local, advanced wound care center (August –November 2016)

Measurement

- Training Impacts on Providers
 - Post Training Provider Survey: Demographics, Reaction to Training, Perception of Knowledge Gained, Self Efficacy/Confidence in Ability to Implement Change, intention to Change Practice Behavior
- Impacts of Training on Patient Outcomes
 - Case Abstraction: Demographics, Assessment strategies used (manual foot exam, PVR with ABI), Timeliness of Care, Diabetic Ulcer Volume and Wagner Grade at treatment onset, 30, 60 and 90 days post treatment onset

Discussion

- Training was well received by providers who indicated they experienced an increase in knowledge, confidence and intent to use PRV with ABI.
- Use of PVR with ABI increased from 27 to 77% across the pre and post-intervention periods.
- While there were no significant differences in patients or patient outcomes at treatment onset or at 30 day follow up, at 60 and 90 days, patients in the post intervention group had significantly lower DFU volumes, Wagner DFU scores and fewer amputations.
- This project should be expanded in size and scope to validate findings and provide for continued assessment of impact.

References

- See available handout for references