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# Inter-observer agreement of the Wagner, University of Texas and PEDIS classification systems for the diabetic foot syndrome



FOOT

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#### ABSTRACT

*Background:* The aim of this cohort study was to assess the inter-observer agreement of three diabetic foot classification systems: the Wagner, the University of Texas and the PEDIS. *Methods:* We included 250 consecutive patients diagnosed of diabetic foot syndrome in 2009–2013. Wound scores were recorded at admission and a reevaluation was performed simultaneously or 24 h later by a different evaluator. Demographical, laboratory data and associated risk factors were obtained from the patients' medical records.

*Results*: The Kappa coefficient showed a moderate inter-observer agreement between the first evaluation and the reevaluation for Wagner scale (Kappa = 0.55; 95% CI: 0.507-0.593), University of Texas scale (Kappa = 0.513; 95% CI: 0.463-0.563) and for PEDIS scale (Kappa = 0.574; 95% CI: 0.522-0.626).

*Conclusions:* This moderate agreement shows that these scales should not be used alone for management decisions regarding diabetic foot syndrome and should, therefore, be integrated with other clinical data to ensure an adequate handover.

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#### 1. Introduction

The foot ulcer is among the late complications of diabetes. It is the most frequent cause of hospitalization (25%), with prolonged stays, among the diabetic patients [1]. Between 14 to 20% of this ulcers will require an amputation [2,3].

Because of the diversity in presentation of diabetic foot ulcers, the treatment strategy selection depends on the experience and skills of the local team of clinicians to classify the wound [4]. Interobserver variation in wound classification may lead to erroneous interpretations [5]. Any clinical classification system should, therefore, have a high reproducibility in terms of inter-observer agreement (IOA) (i.e. repeated measurements of a stable characteristic produce similar results when scored by different observers)

\* Corresponding author at: Angiology and Vascular Surgery Unit, Hospital Universitario Virgen de la Victoria, Campus de Teatinos s/n, 29010 Málaga, Spain. Fax: +34 951 032000. and accuracy, i.e. the ability to assess the true condition of the wound [6].

There are several scales to evaluate the degree of severity of a diabetic ulcer analyzing the characteristics of the ulcer, ischemia and infection. The most used and globally accepted scales are the Wagner scale, University of Texas and PEDIS [7–9]. These scales have demonstrated their utility correlating their degree of severity with the risk of amputation [7–9]. The Wagner scale is easy to use and evaluates the depth of the wound, with the presence of osteitis in intermediate stages and gangrene in advanced stages. It does not evaluate ischemia specifically, but the gangrene can be due to the infection or ischemia in the advanced stages. The University of Texas scale is a little more complex, evaluating the presence of ischemia and infection with the depth of the wound. The PEDIS scale is the most focused on infection [10].

The knowledge of the IOA of these wound classifications could help choose a reliable tool for clinical decision taking regarding the diabetic foot syndrome (DFS). The aim of this study was to assess the IOA of these three wound classification systems: the Wagner, the University of Texas and the PEDIS.

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Secondary aims where to establish the rates of amputations and analyze the factors contributing to this outcome.

## 2. Material and methods

This was a prospective cohort study of 250 consecutive patients diagnosed of DFS and admitted to the Angiology and Vascular Surgery Unit of the San Cecilio University Hospital in Granada, Spain, between January 2009 and September 2013. We included diabetic patients with ulcers with extensive soft tissue and/or bone involvement, with infection and/or ischemia signs, that we did not consider candidates for ambulatory treatment, with either neuropathic, neuroischemic or ischemic etiology. Follow up was during one year in our outpatient clinic. The local Ethics Committee approved the study and all the patients signed an informed consent for participation.

A score sheet was used for this study (see Supplementary material).

It contained information on demographical and laboratory data and associated risk factors, obtained from the patients' medical records and by direct interview, including data on age, sex, height and weight, type of diabetes, retinopathy, bone deformities, excessive alcohol intake (35 U or more a week for men, 21 U or more for women), smoking, cardiac disease, renal disease, pulmonary disease, hypertension, stroke, prior amputations and revascularizations. It also recorded data on the current wound, such as time of evolution, type of wound, type of dressings used, prior use of antibiotics, presence of osteitis (assessed using plain radiographs and Magnetic Resonance when the radiographs were negative) and vascular status (assessed with pulse palpation and ankle brachial index plus pulse volume recording).

Laboratory data was also recorded on the sheet, including C reactive protein (CRP) and white blood cell (WBC) count as a measure of infection.

The sheet also included the Wagner, University of Texas and PEDIS scales with the description of each category.

The first evaluation of the scores was performed at admission, by the admitting vascular surgeon that was part of the study. The second evaluation was performed at the same time if other vascular surgeon was present at admission or 24 h later (the first and the second evaluators were always different physicians). These evaluations where always performed with the score sheets at hand (with the description of each category of the 3 scales) and using surgical tools to determine the depth of the wounds, and performing a probe-to-bone testing. The members of the Angiology and Vascular Surgery Unit (3 senior fellows and 9 staff members; all vascular surgeons) performed these evaluations randomly, including the first and the second evaluation. They had on average 12 years of clinical experience in evaluating and treating diabetic ulcers. This is a reference center for this pathology and many patients are treated every year; therefore, we did not consider any specific training was necessary for this study. Also, since all the physicians involved in this clinical study belong to the same team, their criteria regarding this entity is quite homogeneous.

This study was in a clinical setting, using the available tools in an everyday practice.

We also recorded the rates of minor (toe, ray or transmetatarsal) and major (above or below the knee) amputation in the cohort, and analyzed the factors contributing to these outcomes, including the severity of the wounds according to the 3 scales.

### 2.1. Statistical analysis

Continuous variables are expressed as mean + standard deviation; categorical variables are presented as percentages. Comparison between quantitative variables was performed using Student's t-test and U Mann–Whitney test and for analysis of the qualitative variables the Chi-square and Fisher's exact tests. Data analysis IOA was calculated as an unweighted Cohen's Kappa ( $\kappa$ ) coefficient. The  $\kappa$ -coefficient is a measure of agreement beyond chance. A  $\kappa$ -value above 0.8 is interpreted as 'very good', between 0.8 and 0.6 is 'good', between 0.6 and 0.4 'moderate' and below 0.4 'poor' [11]. Statistical significance was set at P < 0.05. Statistical analysis was performed using SPSS version 20.0 (SPSS, Chicago, IL, USA).

Ta	hle	1

Demographic and laboratory information and risk factors of the cohort.

N250Male sex199 (80%)Age66 years (SD 11.3)Height167 cm (SD 8)Weight77 kg (SD 12)Type of diabetes221 (88%)Type 1221 (88%)Type 229 (12%)Prior amputations11 toe27 (11%)Several toes29 (12%)Contra lateral35 (14%)Bilateral15 (6%)Prior revascularizations7 (3%)Angioplasty7 (3%)By-pass9 (4%)Contra lateral17 (7%)Type of ulcer104 (42%)Neurojschemic122 (49%)Ischemic23 (9%)Site of ulcer104 (42%)Forefoot219 (88%)Midfoof14 (5%)ABI0.7 (SD 0.28)Laboratory data80 mg/d (SD 108)WVC12.6 × 1000/mm² (SD 4.6)VBC12.8 g/d (SD 6)Creatinin1.2 mg/d (SD 0.5)Ording Ulcose235 mg/d (SD 108)WBC12.8 g/d (SD 6)Creatinin1.2 mg/d (SD 0.5)CRP108 mg/l (SD 37)Ablumin3.5 g/l (SD 0.5)CRP108 mg/l (SD 37)Ablumin23 (9%)Smoking23 (9%)Current48 (19%)Prior48 (19%)Prior8 (3%)Coronary disease33 (15%)Congestive heart failure8 (3%)Arthythmia23 (9%)		
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Bilateral  15 (6%)    Prior revascularizations  Angioplasty  7 (3%)    Angioplasty  7 (3%)    By-pass  9 (4%)    Contra lateral  17 (7%)    Type of ulcer  104 (42%)    Neuropathic  104 (42%)    Neuroischemic  122 (49%)    Ischemic  23 (9%)    Site of ulcer  Forefoot    Forefoot  219 (88%)    Midfoof  17 (7%)    Hindfoot  14 (5%)    ABI  0.7 (SD 0.28)    Laboratory data  Blood glucose    WBC  12.6 × 1000/mm³ (SD 4.6)    Hemoglobin  12.8 g/dl (SD 08)    WBC  12.6 × 1000/mm³ (SD 4.6)    Hemoglobin  12.8 g/dl (SD 37)    Total cholesterol  137 mg/dl (SD 37)    Albumin  3.5 g/l (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current    Coronary disease <td></td> <td>55 (14%)</td>		55 (14%)
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Prior revascularizations    Angioplasty  7 (3%)    By-pass  9 (4%)    Contra lateral  17 (7%)    Type of ulcer  104 (42%)    Neuropathic  104 (42%)    Neuroischemic  122 (49%)    Ischemic  23 (9%)    Site of ulcer  Forefoot    Forefoot  219 (88%)    Midfoof  17 (7%)    Hindfoot  14 (5%)    ABI  0.7 (SD 0.28)    Laboratory data  Blood glucose    Blood glucose  235 mg/dl (SD 108)    WBC  12.6 × 1000/mm³ (SD 4.6)    Hemoglobin  12.8 g/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 0.9)    Urea  60 mg/dl (SD 37)    Albumin  3.5 g/l (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Cardiac disease    Coronary disease  38 (15%)		
Angioplasty  7 (3%)    By-pass  9 (4%)    Contra lateral  17 (7%)    Type of ulcer  104 (42%)    Neuropathic  104 (42%)    Neuropathic  122 (49%)    Ischemic  23 (9%)    Site of ulcer  23 (9%)    Forefoot  219 (88%)    Midfoof  17 (7%)    Hindfoot  14 (5%)    ABI  0.7 (SD 0.28)    Laboratory data  Blood glucose    Blood glucose  235 mg/dl (SD 108)    WBC  12.6 × 1000/mm³ (SD 4.6)    Hemoglobin  12.8 g/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 0.9)    Urea  60 mg/dl (SD 37)    Albumin  3.5 g/l (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current  48 (19%)    Prior  106 (42%)    Cardiac disease  53 (21%	Prior revascularizations	
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Contra lateral    17 (7%)      Type of ulcer    104 (42%)      Neuropathic    102 (49%)      Ischemic    23 (9%)      Site of ulcer    23 (9%)      Forefoot    219 (88%)      Midfoof    17 (7%)      Hindfoot    14 (5%)      ABI    0.7 (SD 0.28)      Laboratory data    3      Blood glucose    235 mg/dl (SD 108)      WBC    12.6 × 1000/mm³ (SD 4.6)      Hemoglobin    12.8 g/dl (SD 0.9)      Urea    60 mg/dl (SD 33)      Total cholesterol    137 mg/dl (SD 0.9)      Urea    60 mg/dl (SD 37)      Albumin    3.5 g/l (SD 0.5)      CRP    10.8 mg/l (SD 9)      HbA1c    8.3% (67 mmol/mol) (SD 2)      Retinopathy    109 (44%)      Bone deformities    44 (18%)      Excessive alcohol intake    32 (13%)      Smoking    Current      Coronary disease    38 (15%)      Congestive heart failure    8 (3%)      Arrhythmia    23 (9%)      Renal disease	By-pass	9 (4%)
Type of ulcer Neurojathic104 (42%) NeuroischemicNeurojathic122 (49%) 122 (49%)Ischemic23 (9%)Site of ulcer Forefoot219 (88%) 17 (7%)Midfoof17 (7%) HindfootABI0.7 (SD 0.28)Laboratory data Blood glucose235 mg/dl (SD 108) WBCWBC12.6 × 1000/mm³ (SD 4.6) HemoglobinCreatinin1.2 mg/dl (SD 0.9) 00 (J SD 33) Total cholesterol137 mg/dl (SD 37) Albumin137 mg/dl (SD 37) 3.5 g/l (SD 0.5) CRPRetinopathy109 (44%) 44 (18%) Excessive alcohol intakeSmoking Current Prior109 (44%) 48 (19%) PriorCardiac disease Congestive heart failure Arrhythmia38 (15%) 23 (9%)Renal disease Hypertension53 (21%) 155 (62%) 53 (28)	Contra lateral	17 (7%)
Type of ulcer  Neuropathic  104 (42%)    Neuroischemic  122 (49%)    Ischemic  23 (9%)    Site of ulcer  23 (9%)    Forefoot  219 (88%)    Midfoof  17 (7%)    Hindfoot  14 (5%)    ABI  0.7 (SD 0.28)    Laboratory data  235 mg/dl (SD 108)    Blood glucose  235 mg/dl (SD 0.9)    WBC  12.6 × 1000/mm³ (SD 4.6)    Hemoglobin  12.8 g/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 37)    Albumin  3.5 g/l (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  23 (9%)    Cardiac disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  53 (21%)    Stroke  23 (9%)		
Neuropathic    104 (42%)      Neuroischemic    122 (49%)      Ischemic    23 (9%)      Site of ulcer    Forefoot      Forefoot    219 (88%)      Midfoof    17 (7%)      Hindfoot    14 (5%)      ABI    0.7 (SD 0.28)      Laboratory data    0.7 (SD 0.28)      Blood glucose    235 mg/dl (SD 108)      WBC    12.6 × 1000/mm³ (SD 4.6)      Hemoglobin    12.8 g/dl (SD 0.9)      Creatinin    1.2 mg/dl (SD 0.9)      Urea    60 mg/dl (SD 33)      Total cholesterol    137 mg/dl (SD 9)      HbA1c    8.3% (67 mmol/mol) (SD 2)      Retinopathy    109 (44%)      Bone deformities    44 (18%)      Excessive alcohol intake    32 (13%)      Smoking    23 (9%)      Cardiac disease    38 (15%)      Congestive heart failure    8 (3%)      Arrhythmia    23 (9%)      Renal disease    53 (21%)      Pulmonary disease    15 (6%)      Hypertension    155 (62%)	Type of ulcer	
Neuroischemic122 (49%)Ischemic23 (9%)Site of ulcerForefootForefoot219 (88%)Midfoof17 (7%)Hindfoot14 (5%)ABI0.7 (SD 0.28)Laboratory dataBlood glucoseBlood glucose235 mg/dl (SD 108)WBC12.6 × 1000/mm³ (SD 4.6)Hemoglobin12.8 g/dl (SD 6)Creatinin1.2 mg/dl (SD 0.9)Urea60 mg/dl (SD 33)Total cholesterol137 mg/dl (SD 9)HbA1c8.3% (67 mmol/mol) (SD 2)Retinopathy109 (44%)Bone deformities44 (18%)Excessive alcohol intake32 (13%)Smoking23 (15%)Cornary disease38 (15%)Congestive heart failure8 (3%)Arrhythmia23 (9%)Renal disease53 (21%)Hypertension155 (62%)Stroke23 (9%)	Neuronathic	104 (42%)
Neuroscientic  122 (43%)    Ischemic  23 (9%)    Site of ulcer  Forefoot    Forefoot  219 (88%)    Midfoof  17 (7%)    Hindfoot  14 (5%)    ABI  0.7 (SD 0.28)    Laboratory data  235 mg/dl (SD 108)    Blood glucose  235 mg/dl (SD 0.28)    Laboratory data  12.6 × 1000/mm³ (SD 4.6)    Hemoglobin  12.8 g/dl (SD 6)    Creatinin  1.2 mg/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 9.7)    Albumin  3.5 g/l (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Coronary disease    Cardiac disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  53 (21%)    Hypertension  155 (62%)    Hypertension  155 (62%)	Neuroischomic	122 (40%)
Ischennic23 (9%)Site of ulcer Forefoot219 (88%)Midfoof17 (7%)Hindfoot14 (5%)ABI0.7 (SD 0.28)Laboratory data Blood glucose235 mg/dl (SD 108)WBC12.6 × 1000/mm³ (SD 4.6)Hemoglobin12.8 g/dl (SD 0.9)Urea60 mg/dl (SD 0.9)Urea60 mg/dl (SD 33)Total cholesterol137 mg/dl (SD 9.9)HbA1c8.3% (67 mmol/mol) (SD 2)Retinopathy109 (44%)Bone deformities44 (18%)Excessive alcohol intake32 (13%)Smoking Current48 (19%) PriorCardiac disease Coronary disease38 (15%) Congestive heart failure ArrhythmiaRenal disease53 (21%)Pulmonary disease15 (6%) HypertensionStroke23 (9%)	Inchemie	122(45%)
Site of ulcerImage: Site of ulcerForefoot219 (88%)Midfoof17 (7%)Hindfoot14 (5%)ABI0.7 (SD 0.28)Laboratory data0.7 (SD 0.28)Blood glucose235 mg/dl (SD 108)WBC12.6 × 1000/mm³ (SD 4.6)Hemoglobin12.8 g/dl (SD 6)Creatinin1.2 mg/dl (SD 0.9)Urea60 mg/dl (SD 33)Total cholesterol137 mg/dl (SD 37)Albumin3.5 g/l (SD 0.5)CRP10.8 mg/l (SD 9)HbA1c8.3% (67 mmol/mol) (SD 2)Retinopathy109 (44%)Bone deformities44 (18%)Excessive alcohol intake32 (13%)SmokingCurrentCardiac disease38 (15%)Congestive heart failure8 (3%)Arrhythmia23 (9%)Renal disease53 (21%)Pulmonary disease15 (62%)Stroke23 (9%)	Ischemic	23 (9%)
Sife of ulcer  219 (88%)    Midfoof  17 (7%)    Hindfoot  14 (5%)    ABI  0.7 (SD 0.28)    Laboratory data  12.6 × 1000/mm <sup>3</sup> (SD 4.6)    Blood glucose  235 mg/dl (SD 108)    WBC  12.6 × 1000/mm <sup>3</sup> (SD 4.6)    Hemoglobin  12.8 g/dl (SD 6)    Creatinin  1.2 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 37)    Albumin  3.5 g/l (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current    Cardiac disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  53 (21%)    Pulmonary disease  15 (62%)    Stroke  23 (9%)		
Forefoot  219 (88%)    Midfoof  17 (7%)    Hindfoot  14 (5%)    ABI  0.7 (SD 0.28)    Laboratory data  235 mg/dl (SD 108)    Blood glucose  235 mg/dl (SD 108)    WBC  12.6 × 1000/mm³ (SD 4.6)    Hemoglobin  12.8 g/dl (SD 0.9)    Creatinin  1.2 mg/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current    Current  48 (19%)    Prior  106 (42%)    Cardiac disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  53 (21%)    Pulmonary disease  15 (62%)    Stroke  23 (9%)	Site of ulcer	
Midfoof  17 (7%)    Hindfoot  14 (5%)    ABI  0.7 (SD 0.28)    Laboratory data  235 mg/dl (SD 108)    Blood glucose  235 mg/dl (SD 108)    WBC  12.6 × 1000/mm³ (SD 4.6)    Hemoglobin  12.8 g/dl (SD 0.9)    Creatinin  1.2 mg/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 9.9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current    Cronary disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  53 (21%)    Pulmonary disease  15 (62%)    Stroke  23 (9%)	Forefoot	219 (88%)
Hindfoot  14 (5%)    ABI  0.7 (SD 0.28)    Laboratory data  235 mg/dl (SD 108)    Blood glucose  235 mg/dl (SD 108)    WBC  12.6 × 1000/mm³ (SD 4.6)    Hemoglobin  12.8 g/dl (SD 6)    Creatinin  1.2 mg/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 7)    Albumin  3.5 g/l (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current    Current  48 (19%)    Prior  106 (42%)    Cardiac disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  53 (21%)    Pulmonary disease  15 (62%)    Stroke  23 (9%)	Midfoof	17 (7%)
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ABI  0.7 (SD 0.28)    Laboratory data  235 mg/dl (SD 108)    Blood glucose  235 mg/dl (SD 108)    WBC  12.6 × 1000/mm³ (SD 4.6)    Hemoglobin  12.8 g/dl (SD 0.9)    Creatinin  1.2 mg/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current    Cardiac disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  53 (21%)    Pulmonary disease  15 (62%)    Stroke  23 (9%)		
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Blood glucose  235 mg/dl (SD 108)    WBC $12.6 \times 1000/mm^3$ (SD 4.6)    Hemoglobin $12.8 g/dl$ (SD 6)    Creatinin $12.8 g/dl$ (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol $137 mg/dl$ (SD 0.7)    Albumin $3.5 g/l$ (SD 0.5)    CRP $10.8 mg/l$ (SD 9)    HbA1c $8.3\%$ (67 mmol/mol) (SD 2)    Retinopathy $109$ (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current    Cardiac disease  Songestive heart failure    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  15 (62%)    Stroke  23 (9%)	ABI	0.7 (SD 0.28)
biolog gutose  235 mig/ut (35 mis)    WBC  12.6 × 1000/mm³ (SD 4.6)    Hemoglobin  12.8 g/dl (SD 6)    Creatinin  1.2 mg/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current    Current  48 (19%)    Prior  106 (42%)    Cardiac disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  15 (62%)    Stroke  23 (9%)	ABI	0.7 (SD 0.28)
WBC  12.8 × 1000/mm (SD 4.6)    Hemoglobin  12.8 g/dl (SD 6)    Creatinin  1.2 mg/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 37)    Albumin  3.5 g/l (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current    Current  48 (19%)    Prior  106 (42%)    Cardiac disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  15 (62%)    Stroke  23 (9%)	ABI Laboratory data	0.7 (SD 0.28)
Hemoglobin  12.8 g/dl (SD 6)    Creatinin  1.2 mg/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 0.5)    Albumin  3.5 g/l (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current    Current  48 (19%)    Prior  106 (42%)    Cardiac disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  53 (21%)    Pulmonary disease  15 (62%)    Stroke  23 (9%)	ABI Laboratory data Blood glucose	0.7 (SD 0.28) 235 mg/dl (SD 108)
Creatinin  1.2 mg/dl (SD 0.9)    Urea  60 mg/dl (SD 33)    Total cholesterol  137 mg/dl (SD 0.7)    Albumin  3.5 g/l (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  Current    Current  48 (19%)    Prior  106 (42%)    Cardiac disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  15 (62%)    Stroke  23 (9%)	ABI Laboratory data Blood glucose WBC	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6)
Urea    60 mg/dl (SD 33)      Total cholesterol    137 mg/dl (SD 37)      Albumin    3.5 g/l (SD 0.5)      CRP    10.8 mg/l (SD 9)      HbA1c    8.3% (67 mmol/mol) (SD 2)      Retinopathy    109 (44%)      Bone deformities    44 (18%)      Excessive alcohol intake    32 (13%)      Smoking    Current      Prior    106 (42%)      Cardiac disease    38 (15%)      Congestive heart failure    8 (3%)      Arrhythmia    23 (9%)      Renal disease    15 (62%)      Stroke    23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6)
Total cholesterol  137 mg/dl (SD 37)    Albumin  3.5 g/l (SD 0.5)    CRP  10.8 mg/l (SD 9)    HbA1c  8.3% (67 mmol/mol) (SD 2)    Retinopathy  109 (44%)    Bone deformities  44 (18%)    Excessive alcohol intake  32 (13%)    Smoking  21(13%)    Current  48 (19%)    Prior  106 (42%)    Cardiac disease  38 (15%)    Congestive heart failure  8 (3%)    Arrhythmia  23 (9%)    Renal disease  15 (6%)    Hypertension  155 (62%)    Stroke  23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 0.9)
Albumin3.5 g/l (SD 0.5)CRP10.8 mg/l (SD 9)HbA1c8.3% (67 mmol/mol) (SD 2)Retinopathy109 (44%)Bone deformities44 (18%)Excessive alcohol intake32 (13%)Smoking21 (13%)Current48 (19%)Prior106 (42%)Cardiac disease38 (15%)Congestive heart failure8 (3%)Arrhythmia23 (9%)Renal disease53 (21%)Pulmonary disease15 (62%)Stroke23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 0.9) 60 mg/dl (SD 33)
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Smoking Current48 (19%) PriorPrior106 (42%)Cardiac disease Coronary disease38 (15%) Congestive heart failureArrhythmia23 (9%)Renal disease53 (21%) Pulmonary diseasePulmonary disease15 (6%) HypertensionHypertension155 (62%) Stroke	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 0.9) 60 mg/dl (SD 33) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%)
Smoking Current48 (19%) PriorPrior106 (42%)Cardiac disease Coronary disease38 (15%) Congestive heart failure8 (3%) Arrhythmia23 (9%)Renal disease53 (21%) Pulmonary diseasePulmonary disease15 (6%) HypertensionHypertension155 (62%) StrokeStroke23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 0.9) 60 mg/dl (SD 33) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%)
Current48 (19%)Prior106 (42%)Cardiac disease38 (15%)Coronary disease38 (15%)Congestive heart failure8 (3%)Arrhythmia23 (9%)Renal disease53 (21%)Pulmonary disease15 (6%)Hypertension155 (62%)Stroke23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 0.9) 60 mg/dl (SD 33) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%)
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Cardiac disease38 (15%)Coronary disease38 (15%)Congestive heart failure8 (3%)Arrhythmia23 (9%)Renal disease53 (21%)Pulmonary disease15 (6%)Hypertension155 (62%)Stroke23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 0.9) 60 mg/dl (SD 33) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%)
Cardiac diseaseCoronary disease38 (15%)Congestive heart failure8 (3%)Arrhythmia23 (9%)Renal disease53 (21%)Pulmonary disease15 (6%)Hypertension155 (62%)Stroke23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 0.9) 60 mg/dl (SD 33) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%) 48 (19%) 106 (42%)
Coronary disease38 (15%)Congestive heart failure8 (3%)Arrhythmia23 (9%)Renal disease53 (21%)Pulmonary disease15 (6%)Hypertension155 (62%)Stroke23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 33) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%) 48 (19%) 106 (42%)
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Congestive near failureS (5%)Arrhythmia23 (9%)Renal disease53 (21%)Pulmonary disease15 (6%)Hypertension155 (62%)Stroke23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake Smoking Current Prior	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 12. mg/dl (SD 0.9) 60 mg/dl (SD 33) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%) 48 (19%) 106 (42%) 38 (15%)
Arriyumna23 (9%)Renal disease53 (21%)Pulmonary disease15 (6%)Hypertension155 (62%)Stroke23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake Smoking Current Prior	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 33) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%) 48 (19%) 106 (42%) 38 (15%) 8.(2%)
Renal disease    53 (21%)      Pulmonary disease    15 (6%)      Hypertension    155 (62%)      Stroke    23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake Smoking Current Prior Cardiac disease Coronary disease Congestive heart failure	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 30) 60 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%) 48 (19%) 106 (42%) 38 (15%) 8 (3%) 22 (0%)
Renal disease    53 (21%)      Pulmonary disease    15 (6%)      Hypertension    155 (62%)      Stroke    23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake Smoking Current Prior	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 0.9) 60 mg/dl (SD 33) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%) 48 (19%) 106 (42%) 38 (15%) 8 (3%) 23 (9%)
Pulmonary disease    15 (6%)      Hypertension    155 (62%)      Stroke    23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake Smoking Current Prior Cardiac disease Coronary disease Congestive heart failure Arrhythmia	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 30) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%) 48 (19%) 106 (42%) 38 (15%) 8 (3%) 23 (9%) 50 (100)
Hypertension    155 (62%)      Stroke    23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake Smoking Current Prior Cardiac disease Congestive heart failure Arrhythmia	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 3) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%) 48 (19%) 106 (42%) 38 (15%) 8 (3%) 23 (9%) 53 (21%)
Stroke 23 (9%)	ABI Laboratory data Blood glucose WBC Hemoglobin Creatinin Urea Total cholesterol Albumin CRP HbA1c Retinopathy Bone deformities Excessive alcohol intake Smoking Current Prior Cardiac disease Coronary disease Congestive heart failure Arrhythmia	0.7 (SD 0.28) 235 mg/dl (SD 108) 12.6 × 1000/mm <sup>3</sup> (SD 4.6) 12.8 g/dl (SD 6) 1.2 mg/dl (SD 33) 137 mg/dl (SD 37) 3.5 g/l (SD 0.5) 10.8 mg/l (SD 9) 8.3% (67 mmol/mol) (SD 2) 109 (44%) 44 (18%) 32 (13%) 48 (19%) 106 (42%) 38 (15%) 8 (3%) 23 (9%) 53 (21%) 15 (6%)
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