

1 **Full Title:**

2 5 year retrospective follow-up of new cases of Charcot neuroarthropathy – a
3 single centre experience

4
5 **Short Title:**

6 Outcomes after 5 years of follow up of newly diagnosed Charcot

7
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37 Word Count: Abstract – 150 Main manuscript – 2995

38
39 TM and CS were medical students at the time this work was undertaken and
40 contributed equally to this work.

41
42 **Funding:** All of the authors are employees of the UK National Health Service.

43
44 **Duality of Interest** The authors declare that there is no duality of interest
45 associated with this manuscript.

48 Abstract

49 Background:

50 Few data describe the natural history of Charcot Neuroarthropathy treated with a
51 total contact plaster cast (TCC).

52 Methods:

53 A 5 year retrospective analysis of 50 patients presenting with an acute CN,
54 Assessing time to clinical resolution into appropriate footwear and assessing if
55 initial immobilisation device influenced resolution time.

56 Results:

57 During the study period 42 patients (84%) of patients went into remission, 2 died
58 during their treatment, 4 had major amputations, in 2 patients treatment was
59 ongoing. 36 patients were treated with combination offloading devices, 6 were
60 treated with one modality only. Median time to resolution for patients initially
61 treated with a TCC was not significantly shorter than for those treated with a
62 removable below knee boot. 34.9% required re-casting due to clinical
63 deterioration in the removable device.

64 Conclusions:

65 More precise measures of resolution of CN are needed to assess the impact of
66 initial treatment modality on time to resolution.

- 67 Keywords
- 68 Charcot neuroarthropathy
- 69 Diabetes
- 70 Clinical resolution
- 71 Total contact plaster cast
- 72 Below knee removable walking boot
- 73
- 74

75 **Introduction**

76 Diabetes mellitus (DM) is a common condition affecting 382 million people
77 globally, a number predicted to rise to 592 million by 2035 [1]. Diabetic foot
78 disease is a common problem globally, and has major consequences for patients
79 and society in general [2]. Between 2010 and 2011 the estimated cost of
80 diabetes related ulceration and amputation to England was £639-661 million [3].
81 This data also showed that regular contact with a specialist diabetic foot
82 multidisciplinary team decreased the costs to the NHS [3].

83

84 Charcot neuroarthropathy (CN) is an uncommon complication of diabetes.
85 Population based studies have estimated a prevalence of CN of 0.1-0.5% in
86 people with diabetes, rising to 13% in high risk patients [4]. Patients may present
87 to any one of several different specialities such as orthopaedics, rheumatology or
88 even accident and emergency departments. The diagnosis is frequently missed,
89 and there is often a delay in starting treatment [5]. Once diagnosed, the
90 treatment is immobilisation using a total contact plaster cast (TCC) or, if this is
91 not available, a removable below knee walking boot [6]. It has been estimated
92 that the average cost of managing a CN in community and outpatient setting is
93 £2,710 per foot. The total cost for treating CN in the UK is over £6.5 million per
94 annum [3].

95

96 Whilst uncommon, CN can be a potentially devastating end-stage complication of
97 diabetes mellitus. If there is a delay in treatment, CN is often associated with

98 progressive foot deformity and resultant ulceration and infection. For patients
99 with an uncomplicated CN, the risk of amputation is <2% [7]. However, the
100 presence of an ulcer increases the risk of amputation between 12-13 times [7].

101

102 The pathogenesis of CN is presently poorly understood [6]. However, the
103 longstanding theory regarding the pathophysiology of the disease - the
104 neurotrophic theory originally described by Charcot, still has a role [8]. In
105 addition, more recent work suggests that the inflammatory cascade plays an
106 important role in developing the condition and may be a therapeutic target in the
107 future [9].

108

109 A recent, large systematic review suggested that the current gold standard
110 management of acute CN consists of immediate referral to a multidisciplinary
111 foot-care team followed by immobilisation of the foot in a TCC [10]. These
112 recommendations are consistent with the guidelines from the UK National
113 Institute for Clinical and Health Care Excellence [11]. **However, we acknowledge**
114 **that there are variations in what people accept as the gold standard – with some**
115 **centres using alternative methods of immobilisation such as the instant total**
116 **contact cast or removable devices. A large prospective randomised trial is**
117 **needed to address this.**

118

119 There are few data describing the natural history of CN, particularly when treated
120 with the TCC. A recent multicentre observational study of patients with acute CN

121 found that median time to resolution was 9 months in patients treated initially with
122 a non-removable offloading device, compared to 12 months in those treated
123 initially with a removable offloading device [12]. The same authors also reported
124 a major amputation rate of 3.1% (n=9).

125

126 To further our understanding of the natural history of acute CN treated with TCC,
127 we undertook a retrospective single centre study. Our aim was to look at time
128 taken to achieve clinical resolution and to see if the initial device used to
129 immobilise the foot influenced time to resolution. A secondary outcome was to
130 see how many people relapsed when they came out of the TCC. A further
131 secondary outcome was to see if the location of the Charcot influenced time to
132 clinical resolution.

133

134

135 **Methods**

136 We performed a retrospective analysis of patients presenting to a single centre
137 tertiary foot clinic with a diagnosis of acute CN between October 2007 and
138 October 2012. Patients were searched our electronic database using the
139 keyword “Charcot”.

140

141 Patients were included in the study if they had either type 1 or type 2 DM. The
142 acute CN must have developed within the study period, and the patients must
143 have been managed as an acute CN. Patients were excluded if an acute CN was
144 deemed unlikely from the history and clinical examination, or if imaging studies
145 were negative or another diagnosis was found to be causative or more likely. A
146 strong clinical suspicion of acute CN with negative imaging studies would not
147 exclude a patient from the study. Patients were also excluded if they had a
148 chronic CN.

149

150 Data collection was achieved by the examination of electronic hospital records
151 and hand-written clinic notes. Baseline demographics for study subjects were
152 recorded, as were details of the acute CN. We looked at the site of CN, method
153 of treatment, time in treatment method, and time to resolution. Resolution was
154 determined by the point of transition from treatment to either own or hospital
155 supplied footwear. Data was also collected on complications such as amputation
156 and mortality. Patients were followed-up until the end of the study period.

157

158 For baseline demographics such as HbA1c and retinopathy, the most recent
159 value recorded within a one year timeframe either side of the diagnosis was
160 used. This timeframe was set as often tests were last or next performed at the
161 patients' diabetes annual review.

162

163 Site of CN was categorised into one of the following: forefoot; mid-foot; hind-foot
164 and ankle; or mixed. A pre-defined classification criteria was not used as not all
165 patients were diagnosed radiologically, leaving uncertainty around the exact
166 location of the CN when it involved the hindfoot or ankle.

167

168 Data were analysed using SAS statistical software, version 9.3 (Marlow,
169 Buckinghamshire, UK).

170

171

172 Results

173 50 patients were included. All patients had foot pulses palpable, and were
174 insensate to 10g Semmes-Weinstein monofilament testing at the time of
175 diagnosis of CN. However, 2 people died during the course of the study. Figure 1
176 shows the numbers at each stage of the patient inclusion / exclusion criteria. All
177 were diagnosed and managed at the same centre within the time period of the
178 study. The specialist foot clinic was run by 2 of the authors (CG and KD) as part
179 of the multidisciplinary foot clinic, which included 2 orthopaedic surgeons
180 specialising in foot and ankle surgery.

181

182 The mean age (\pm SD) at CN diagnosis was 62.5 ± 11.7 years. 34 (68%) were male.
183 11 (22%) had T1DM. The median duration of diabetes (IQR) was 32.0 years
184 (19.8, 38.0) for those with T1DM, and 15.0 years (4.5, 20.0) for those with T2DM.
185 Mean HbA_{1c} (\pm SD) was 65 ± 20 mmol/mol (8.1%), (T1DM 70 ± 19 mmol/mol
186 [$8.6\pm 3.9\%$]); T2DM 64 ± 20 mmol/mol [$8.0\pm 4.0\%$]).

187

188 At diagnosis of acute CN 12 patients had chronic kidney disease (CKD) stage 0
189 or 1, 21 patients (42%) had CKD stage 2 and 17 patients (34%) had CKD stage
190 3-4. 9 patients had no evidence of retinopathy, 27 had a grading of R1
191 (background), with 10 of these having R1, M1 (background retinopathy and
192 macular involvement), 3 had R2 (pre-proliferative disease) – one of these had
193 macular disease (R2 M1), 8 had R3 (proliferative retinopathy), 3 with macular

194 disease (R3 M1). 1 patient was recorded as having retinopathy with no grade
195 given. Retinopathy data was unavailable for 2 patients.

196

197 Of the 50 patients, only 15 were able to recall an episode of trauma to the
198 affected foot within the preceding 12 months. During the study period, 4 patients
199 had major amputations and 3 had minor amputations or debridement to the
200 affected foot.

201

202 40 patients (80%) had a difference in foot temperature of $>2^{\circ}\text{C}$ at presentation,
203 with the affected foot being warmer. There was no data available for 4 (8%)
204 patients. 6 patients (12%) had foot temperature difference of $<2^{\circ}\text{C}$ at
205 presentation, however all of these were diagnosed and managed as acute CN on
206 clinical grounds, with 4 of the 6 having an acute CN confirmed radiologically. In
207 total, 30 patients (60%) had a diagnosis of acute CN confirmed radiologically, by
208 X-ray, MRI or both. The others were treated on clinical grounds because they
209 had presented with a hot, swollen, and deformed insensate foot but in whom
210 repeated imaging showed no abnormality. All patients were followed up
211 radiologically.

212

A

213 *Charcot site*

214 During the study, 42 patients went into remission, with foot temperatures $<2^{\circ}\text{C}$ for
215 greater than 6 weeks (3 consecutive visits to the foot clinic) and stable
216 radiographic imaging. Of these 11.9% were in the forefoot, 64.3% in the mid-

217 foot, 19.1% in the hind-foot or ankle, with 4.8% in multiple sites. Median times to
218 resolution for CN depending on location were not significant ($p=0.3814$), and are
219 shown in Table 1.

220

A

221 *Offloading device (Figures 2a and 2b)*

222 36 of the 42 patients who went into remission (85.7%) were treated with both
223 TCC and removable offloading device. The removable offloading device was
224 used to wean the patients out of the TCC and into footwear. 25 (59.5%) were
225 initially treated with a TCC, whilst the remaining 17 (40.5%) started in a
226 removable offloading device. 6 patients were treated with one modality only – 1
227 patient was treated with TCC only, and the other 5 were treated with a removable
228 offloading device only. For these 42 patients, median time to resolution was 51.5
229 weeks (IQR 37-68). Of this, a median of 26 weeks (IQR 12-39) was spent in
230 TCC, with 18 weeks (IQR 13-31) being spent in a removable offloading device.

231

232 Median time to resolution for the 26 patients initially treated with a TCC was 48
233 weeks (95% CI: 42.4, 64.4) compared to the median time of 53 weeks (95% CI:
234 42.5, 64.4) for the 22 patients initially treated with removable offloading device (p
235 = 0.7681, Appendix 1).

236

237 43 patients out of the initial 50 patients in the study used a TCC at some stage
238 during their treatment. Having achieved clinical remission using our standard
239 definition, they transferred from a TCC into a removable device. However, 15 of

240 these 43 (34.9%) relapsed and required re-casting due to clinical deterioration of
241 the acute CN. The median time to resolution for these 15 patients was 68 weeks
242 (95% CI: 53, 89) compared to the 32 patients who had no re-casting, who had a
243 median time to resolution of 42.5 weeks (95% CI: 35, 48) ($P < 0.0001$ log rank
244 test). More work needs to be done to try and identify those who are at greatest
245 risk of clinical deterioration or when the correct time to take the cast off. We used
246 the standard clinical indicators of 3 consecutive clinical appointments at least 2
247 weeks apart with a temperature difference of less than 2 degrees Celsius with
248 stable radiological appearances to diagnose resolution of the CN [6].

249

250 13 out of the initial 50 patients had an ulcer on the same foot as the acute CN at
251 the start of treatment. Of these, 1 patient underwent below knee amputation
252 whilst 12 went successfully into remission without further complication. In 3
253 patients the CN was diagnosed when they presented with avulsion fractures to
254 the foot.

255

256 Whilst patients were in a cast, very few developed any complications as a result.
257 All of these were minor - the most common being a rub. However, no patients
258 changed their treatment as a consequence of these. In addition, our clinic
259 protocols mean that patients have their cast changed weekly or every other
260 week, but in addition, they have 'open access to the specialist foot clinic if they
261 feel they have a problem with the cast.

262

263 Time to healing was not associated with the presence of chronic kidney disease,
264 retinopathy, HbA1c or duration of diabetes (see Appendix 1).

265

266

267 Discussion

268

269 This study has shown that 50 patients presented to our tertiary specialist foot
270 clinic with a new diagnosis of Charcot neuroarthropathy during a 5 year period.
271 When treated, the median time to resolution and transfer to appropriate footwear
272 was 1 year (52.25 weeks, IQR 25, 81). Our study also showed a 34.9%
273 deterioration rate after coming out of TCC, and found that re-plastering was
274 found to be associated with a significantly increased time to resolution ($p < 0.0001$,
275 log rank test). This implies that despite clinical resolution of the acute phase of
276 the Charcot process (a temperature difference of $< 2^{\circ}\text{C}$ for 3 consecutive visits,
277 each at least 2 weeks apart)[6] and a 'step down' into the removable below knee
278 walking boot, those patients were taken out of the TCC too early. Another
279 possible explanation for this is that the patients were more mobile than they had
280 been advised to be, thus causing a reactivation of the Charcot process. However,
281 our data is consistent with previous work that showed relapse rates vary,
282 between 12% and 33% [13,14,15,16].

283

284 Our data further show that the longer the TCC remained on, the greater the time
285 to resolution, but also a lower chance of subsequent deterioration. This is in
286 contrast to the work by Christensen et al who showed that the use of a
287 removable offloading device as the sole treatment method of acute CN led to
288 average treatment duration of approximately 5 months [16]. This is significantly

289 less than the present study, or other authors who used TCC as a part of their
290 management strategy [12,15].

291

292 The current data take into account that our service covers a large, predominantly
293 rural, geographical area and when patients are first diagnosed they have often
294 driven to the clinic. Whilst we would prefer to offer them the gold standard
295 treatment of the TCC at the time of diagnosis, we are aware of the significant
296 negative impact this decision would have on their lives and so many opt to use
297 the below knee removable walking boot for a few days until they arrange
298 transport back to our clinic to go into a TCC. We analysed whether this initial
299 treatment modality had an impact on overall time to resolution. It is likely that the
300 non-statistically significant shorter time to resolution in those patients initially
301 treated with a TCC is a reflection of the relatively small sample size.

302

303 Whilst there is general consensus that immobilisation of the foot is necessary to
304 prevent progression in the acute Charcot foot, there is generally poor quality
305 evidence to differentiate between a TCC and a removable below knee walking
306 boot [10]. The results of the current study are in contrast to those reported by the
307 CDUK group who found that median time to resolution varies greatly between
308 those initially treated in a non-removable device, e.g. a TCC compared to
309 removable offloading device (9 months and 12 months respectively) [12]. That
310 study, however, used data from many centres across the UK and there was no
311 standardisation on set point or definition of 'resolution'. This could have impacted

312 the duration of treatment. The authors also acknowledged that their work “may
313 have been influenced by selection bias” despite their efforts to include all patients
314 diagnosed with acute CN from each centre [12]. This made it difficult to draw
315 conclusions on true treatment times because it was unknown which patients
316 were and were not included. However, worldwide there is a significant variation in
317 the median period of immobilisation; in the UK observational work has reported
318 durations of 9-12 months [12], whilst data from the USA and other European
319 centres reported periods of immobilisation for only 4-6 months [17,18,19]. We
320 acknowledge that some of this variation may be due to differences in the
321 offloading devices and techniques. For example, some areas may use double-
322 shelled orthosis adapted to the patient but removable and patellar tendon-
323 adapted, or in the US where the use of ‘knee scooters’ may be more prevalent.
324 To address some of this variation in care, a national casting course has been
325 developed in the UK [20]. Our results also agree with previous data presented in
326 abstract form only from another large centre in the UK who found the median
327 duration of treatment for their patients to be 11 months [15].

328

329 As others have reported, our patients had several diabetes related comorbidities,
330 including chronic kidney disease and retinopathy [21,22], suggesting that the
331 development of CN and other microvascular disease may share a common
332 pathway.

333

334 4 patients underwent below knee amputation (BKA) within the duration of the
335 study. Of these, 1 patient had a neuropathic ulcer and the others had hindfoot
336 Charcot's with significant deformity at presentation. Of these, 2 declined to be put
337 into a cast and deteriorated to a stage where their foot and ankle became
338 unstable. All of the patients declined any reconstruction and their feet became
339 unsalvageable. The final patient deteriorated despite being in a TCC for 34
340 weeks and developed significant ulceration and infection requiring amputation.
341 Our study has shown an 8% amputation rate for patients with acute CN. Sohn et
342 al suggested that the presence of an ulcer increased the likelihood of amputation
343 12 fold [7]. Our amputation rate was higher than found by several recent studies,
344 with the UK wide CDUK group reporting a 3.1% major amputation rate, and the
345 2% reported by Sohn et al, but much lower than the rate reported by Gazis et al
346 of 23.4% [12,7,23]. However, there remain concerns about the validity of their
347 data because of the previously mentioned concerns – that the CDUK study had a
348 degree of selection bias [12], and the data from Sohn et al also included data
349 from several centres, and they too noted they were unable to obtain data on
350 amputation rates from some centres, so their figures are likely to be an
351 underestimate [7].

352

353 The mortality reported in the present study is in line with previous work.
354 Armstrong et al reported no deaths among 55 patients during a 92.6 week mean
355 follow-up [19], with Fabrin et al reporting a 1.7% mortality among 115 patients
356 during a 4 year follow up [14]. In contrast, Jeffcoate et al. showed a mortality of

357 44.7% amongst 47 patients with a mean of 3.7 year follow-up and a major
358 amputation rate of 1.7% [23]. A more recent study showed a lower mortality of
359 18.6% amongst 70 patients with CN after a median follow-up of 2.1 years,
360 However, this was not statistically significantly different from the mortality rate
361 amongst 66 matched control patients ($p = 0.094$) [24].

362

363 There are few robust data describing the influence of anatomical location and
364 rates of healing. However, our data are in contrast to previous work from a
365 smaller cohort, that suggested that the duration of immobilisation may be
366 influenced in part by the anatomical location of the CN [17].

367

368 The strength of the current paper is that it is data from a single site with complete
369 follow up on all of the patients. All of the patients were managed in the same way
370 by the well-established diabetic foot MDT. Our team are able to offer our
371 preferred initial treatment modality for Charcot, the TCC, in the diabetic foot clinic
372 at the time of initial diagnosis, without delay.

373

374 It has recently been suggested that the findings on MRI should be adopted as the
375 criterion standard for establishing disease activity and diagnosing remission [25].

376 This is because MRI has the greatest potential to monitor the effect of treatment
377 since it shows bone marrow oedema. However, the use of serial MRI as a tool to
378 monitor for signs of disease remission was not used in our centre because it was
379 not routinely recommended and remains a tool to be kept in reserve as

380 suggested in a recent systematic review [10]. There is emerging data to suggest
381 that this should change, and MRI should be used more frequently [26].

382

383 Limitations include that our population is exclusively White Caucasian, and thus
384 the generalizability may be limited when considering other populations.

385 Furthermore, only 60% had a confirmed radiological diagnosis of a Charcot foot –
386 with all of the others being radiologically normal, but with all of the other clinical
387 features of a Charcot foot. The recommendations are to treat on clinical ground
388 and not wait for radiological confirmation [10]. In addition, we feel that we have
389 an excellent primary care network that refers to the specialist foot clinic early,
390 thus preventing the development of bony deformity.

391

392 We were unable to determine compliance with minimal weight bearing and the
393 use of removable offloading devices when they were issued. Previous work has
394 shown that compliance levels are low when devices are removable [27]. **Future**
395 **work may be able to use newer technologies to assess this.**

396

397 We are a tertiary referral centre, and over 15% of our work comes from other
398 centres that are unable to apply a TCC. Patients are referred to us if there are no
399 early signs of clinical resolution, usually in removable device. This is likely to lead
400 to a longer time to resolution. Furthermore, there may have been a delay in the
401 time between healing and the time for the patients to be provided with hospital
402 footwear. During this time it was usual for patients to remain in the removable

403 device, thus artificially lengthening their time to resolution. However, this decision
404 to classify resolution until footwear was available was deliberate, and in line with
405 previous work [12], because for many patients this is the time that they are able
406 to return to their former levels of activity, and thus more accurately reflects the
407 personal impact of the disease on the patient.

408

409 In summary, this work has shown that initial treatment with a TCC improves
410 times to resolution for patients with acute CN. As a result of this work that all
411 patients referred to us with a suspected CN are advised on the telephone when
412 the appointment is being made, not to drive to their clinic appointment so that if a
413 cast needs to be applied, there is no delay.

414

415 However, a significant proportion of patients required re-immobilisation despite
416 using recognised markers of resolution. This study highlights the need to develop
417 more precise measures to help manage acute CN, and assess the impact of
418 initial treatment modality on time to resolution.

419

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511 **Legends**

512 **Appendix 1**

513

514 Summary of univariate results

515

516

517 **Table 1**

518 Time to improvement by site location in those 42 patients who went into

519 remission.

520

521 **Figure 1**

522

523 Consort diagram to show patient selection process

524

525 **Figure 2a**

526

527 A picture of a total contact cast

528

529 **Figure 2b**

530

531 A picture of a below knee removable walking boot

532 Table 1

533

Time to Improvement By Site Location	N	N Missing	Mean	SD	Min	Max	Median	IQ Range
Active Charcot - forefoot	5	0	47.2	22.6	14	68	50	(37,67)
Active Charcot – midfoot	27	2	56.2	30.3	16	159	53	(40,68)
Active Charcot – Ankle/hindfoot	8	4	51.8	23.1	12	79	53	(36.5,72)
Mixed	2	0	53.0	39.6	25	81	53	(25,81)

534

535

Appendix 1. Summary of univariate results

Results for continuous variables

	Variable	Initial Device	N	Mean	SD	N Missing	Minimum	Maximum	Median	95% CI	IQ Range(25th,75th)	P
<i>Time to Improvement</i>	Removable		17	53.5	23.1	0	14	98	53.0	(42.5,64.4)	(37.0,68.0)	0.7681
	TCC		25	54.6	31.1	6	12	159	48.0	(42.4,66.8)	(38.0,67.0)	
<i>DM Duration</i>	Removable		15	21.5	17.0	2	0	49	19.0	(12.9,30.1)	(6.0,35.0)	0.4777
	TCC		27	16.4	10.0	4	1	40	18.0	(12.7,20.2)	(8.0,23.0)	
<i>Age</i>	Removable		17	65.1	11.3	0	39	79	67.0	(59.8,70.5)	(57.0,73.0)	0.2028
	TCC		31	60.5	12.0	0	43	82	61.0	(56.3,64.8)	(49.0,70.0)	
<i>HbA1c</i>	Removable		17	63.2	17.6	0	37	101	61.0	(54.8,71.5)	(53.0,67.0)	0.4444
	TCC		31	67.8	21.0	0	42	115	61.0	(60.4,75.2)	(52.0,85.0)	
<i>Initial Device Duration</i>	Removable		17	11.8	13.0	0	1	41	7.0	(5.6,17.9)	(1.0,14.0)	0.0014
	TCC		31	27.8	19.2	0	2	82	26.0	(21.0,34.5)	(15.0,35.0)	
<i>Second Device Duration</i>	Removable		17	15.9	15.8	0	0	55	8.0	(8.4,23.5)	(2.0,27.0)	0.7295
	TCC		31	14.3	15.2	0	0	74	13.0	(8.9,19.6)	(3.0,18.0)	
<i>Time in TCC</i>	Removable		16	23.5	20.1	1	0	57	21.5	(13.7,33.3)	(3.0,32.5)	0.2402
	TCC		29	33	26.0	2	2	106	26.0	(23.6,42.5)	(15.0,47.0)	
<i>Time in Removable Device</i>	Removable		17	30.4	17.4	0	8	79	28.0	(22.1,38.7)	(18.0,39.0)	0.0058
	TCC		29	18.3	16.0	2	0	74	16.0	(12.5,24.2)	(7.0,20.0)	
<i>Number of Device changes</i>	Removable		17	4.1	2.6	0	1	9	3.0	(2.8,5.3)	(3.0,5.0)	0.0579
	TCC		31	2.9	2.2	0	1	12	2.0	(2.1,3.7)	(2.0,4.0)	

Summary of univariate results

<i>Variable</i>	<i>Value</i>	<i>N</i>	<i>Number Missing</i>	<i>Total</i>	<i>TCC (N)</i>	<i>TCC (%)</i>	<i>Removable Device (N)</i>	<i>Removable Device (%)</i>	<i>P-value (Chi-square)</i>
<i>DM Type</i>	Type 1	48	0	11	4	23.5	7	22.6	0.9404
	Type 2			37	13	76.5	24	77.4	
<i>Charcot Site</i>	Active Charcot – Forefoot	48	0	5	3	17.6	2	6.5	0.3814
	Active Charcot – Midfoot			29	11	64.7	18	58.1	
	Active Charcot – Ankle/hindfoot			12	3	17.6	9	29.0	
	Mixed			0	0	0.0	2	6.5	
<i>Re-plastered</i>	No	47	1	32	22	73.3	10	58.8	0.3052
	Yes			15	8	26.7	7	41.2	
<i>Precipitating Trauma</i>	No	47	1	33	21	70.0	12	70.6	0.9662
	Yes			14	9	30.0	5	29.4	
<i>Recent Foot Surgery</i>	No	47	1	41	26	83.9	15	93.8	0.3362
	Yes			6	5	16.1	1	6.3	
<i>Retinopathy</i>	No	48	0	9	4	12.9	5	29.4	0.1611
	Yes			39	27	87.1	12	70.6	
<i>Maculopathy</i>	No	48	0	33	20	64.5	13	76.5	0.3928
	Yes			15	11	35.5	4	23.5	
<i>Gender</i>	Male	48	0	32	21	67.7	11	64.7	0.8310
	Female			16	10	32.3	6	35.3	
<i>CKD</i>	Stage 0 and 1	48	0	11	7	22.6	4	23.5	0.6312
	Stage 2			21	15	48.4	6	35.3	
	Stage 3 and 4			16	9	29.0	7	41.2	

Figure 2



