

## Dental implant treatment following trauma:

### An investigation into the failure to complete Accident Compensation Corporation funded care

Kennedy R, Murray C, Leichter J

#### ABSTRACT

**Background and Objectives:** Among other restorative strategies, the Accident Compensation Corporation (ACC) provides benefits for dental implant treatment to replace teeth lost as a result of trauma. While ACC has funded over 15,000 dental implants since 2002, the outcomes of this treatment and patient perceptions of this treatment have not been investigated. The aim of this study was to investigate the perceptions of the dental implant treatment outcomes and reasons for failure to complete restorative treatment in patients who had undergone trauma-related implant surgery funded by ACC between February 2006 and September 2009, but had not completed the prosthetic component of the treatment.

**Methods:** A randomly selected sample of 399 patients, who had undergone dental implant surgery but not completed the crown restoration, was identified from the ACC database. These individuals were contacted by mail for expressions of interest, and 181 clients were interviewed by telephone. Responses to open-ended questions were entered into an Excel spreadsheet and analysed using a general inductive technique.

**Results:** A common emergent theme was the high level of satisfaction expressed by participants with the implant process, however just under half of those responding felt they had been pushed into having implants and were given the impression that this was the only treatment ACC paid for. The cost of the prosthetic phase of the treatment and surgical complications were identified as the primary reasons why participants failed to complete the restorative phase of treatment, after completing the surgical phase.

**Conclusions:** The results highlighted the need to better inform patients of their treatment options and to allow time for them to process this information before progressing with care. A patient decision tool may help to give greater ownership of the treatment options. Newly implemented protocols to assist dentists to better assess treatment needs may also assist in achieving improvements in perceived treatment outcomes for patients.

legal proceedings against another person or organisation for compensation for their injuries. The Act required ACC to pay for a wide range of treatments and services to rehabilitate patients who suffer from injuries (the clients and claimants covered by ACC) as closely as practicable to their pre-accident condition. The stated aim of ACC is to return clients to work as soon as possible following the injury (trauma) and if necessary provide support and aids to do this (Ministry of Business Innovation and Employment 2001). Dental treatment, including the replacement of teeth using dental implants for the support or retention of a prosthesis, is part of the range of oral rehabilitation costs that ACC contributes towards.

Prior to 1999, ACC paid for the commonly accepted treatment modalities of crowns, bridgework and metal partial dentures. ACC has been responsive to changes in the range and choice of prosthetic solutions available for the restoration of tooth loss and damage and payment for treatment that included dental implant surgery commenced in 1999. This was enabled by a change to the Accident Insurance Act of 1998. Further changes in Dental Regulations in 2003 allowed for the inclusion of items for the restoration of dental implants. This included compensation for implant crowns, definitive abutments, surgical stents and implant fixture head impressions.

The number of dental implants funded by ACC increased each financial year from 2000 to reach a peak of 1996 implants in 2009. Since that time, the number of implants has declined each year and 1050 implants were placed for the year ending 30 June 2012. This change may be due to economic factors, a reduction in the backlog of clients requiring dental implant treatment or the development of new evidence-based client selection guidelines for implant treatment. From December 2010 a new treatment planning and assessment form (ACC899) was added to the protocol used for prior approval of dental implant therapy and a more restorative-driven approach was adopted. Prior to this, implant treatment could be initiated by the surgical provider, with little or no input from the dentist involved in the restorative work.

ACC is currently the largest third-party funder of dental implant therapy in NZ. A retrospective audit of ACC data in September 2009 identified 881 clients of ACC who were recorded as having had implant surgery, but not having completed restoration of the dental implant that had been provided during the period 23 February 2006 to 23 September 2009.

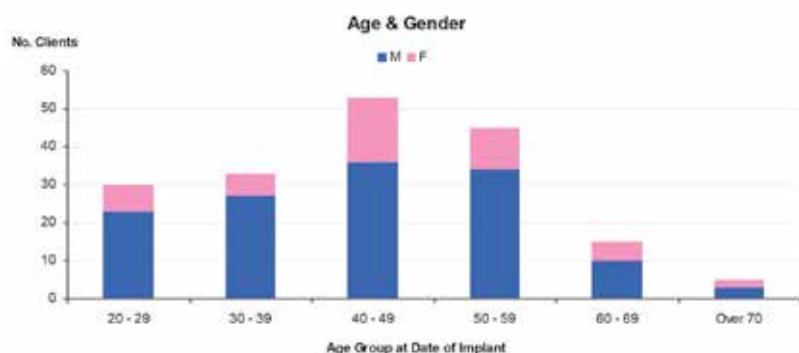
While it was hypothesized that some of the 881 clients might have still been in the healing phase of their implant surgery, other clients had completed the surgical implant placement more than three years prior. Dental implant treatment, in most instances, should lead to completion of a restoration within 12 months, irrespective of surgical protocol. The aim of the present study was to investigate why final restoration had not occurred in the identified cases, and to evaluate the perceptions of clients about the care they had received, particularly in light of the large number of implants that are being provided in NZ.

#### INTRODUCTION

The Accident Compensation Corporation of New Zealand (ACC) is an entity created by the Government of New Zealand (NZ) from the passing of the Accident Compensation Act in 1972 (Martin 2003). The Accident Compensation Act 2001 removed the ability of residents and visitors to NZ to take



**Figure 1.** Regional distribution and ethnicity of clients who had not completed restoration following implant placement as part of ACC funded treatment.



**Figure 2.** Age range and gender of patients who were identified from the ACC database with incomplete restoration.

## METHODS

ACC Ethics Committee approval was received to identify the stage of treatment reached for clients having implant surgery, to investigate clients' perceptions of treatment outcomes of those who had undergone ACC-funded implant surgery between February 2006 and September 2009, and to explore the reasons for failure to complete the restorative component of the implant treatment if this was the case. A total of 881 clients were identified as having had the surgical placement of a dental implant, but had not completed the superstructure by 23 September 2009. Of these 881 clients, 399 were randomly selected by computer and sent a written correspondence seeking an indication of their willingness to participate in a telephone interview. A return addressed envelope was included for their reply.

The six interview questions asked by the ACC staff member in the telephone survey were as follows:

*Do you have a crown on your implant? If not, do you know why this is?  
Were you happy with the treatment process? How does your crown look and function? What was paid for the crown? Are there any other comments you wish to make?*

These questions were pre-tested prior to obtaining ethical approval. The telephone interviews were conducted by a single trained ACC staff member (RK) who was experienced with the process of implant therapy. Demographic data and responses to the questions were recorded on separate worksheets for each respondent. The numeric data and narrative were entered into an electronic

spreadsheet using Microsoft Excel. Responses to questions were then analysed for common themes using a general inductive technique.

## RESULTS

Of the 399 clients originally contacted by mail, 181 clients were interviewed giving a response rate of 45.0%. Almost all of the implants involved were to replace maxillary anterior teeth ( $n = 179$ ). The remaining two replaced a mandibular anterior tooth and a mandibular first permanent molar. The majority of the respondents listed their ethnicity as European (Figure 1). Two thirds were male and under 50 years of age (Figure 2). More than three quarters ( $n = 146$ ) were found to have completed implant restoration by the time of the survey. The most common reason for failure to complete restoration was surgical complication (31%). Cost was cited as a factor for 26% of the patients not completing restoration. The patient's schedule, a restorative complication and fear were cited by a small number of the remaining respondents as barriers to completion of treatment (Figure 3).

Overall, respondents in this study were satisfied with the treatment process and outcomes (Figure 4). Almost half of those surveyed reported a high level of satisfaction with the completed restoration, while one fifth, although indicating satisfaction with treatment, qualified this with areas of dissatisfaction such as unnatural appearance, continuing pain, time delay to complete the crown following surgery, and problems with the process. One fifth of the respondents were very disappointed with the outcome of care on most levels. Disappointing aspects cited by these respondents included failure (of implants and/or restorations), poor aesthetics, constant metal taste, gingival problems, complications in fitting the crown, or a misaligned implant.

A common theme that emerged was that both satisfied and dissatisfied respondents felt that they had been pushed into having implants and were given the impression that this was the only treatment ACC paid for. These respondents reported that their dentist organised and/or carried out all aspects of the process and built an expectation for high success rates from implant treatment. Some respondents felt "that they were on an assembly line" while others commented that, when they had complications, they "were left with nowhere to go because payment had already been provided to the clinician by ACC". Most respondents indicated that they had been informed of the level of the co-payment expected for the crown at the beginning of treatment. However, the quoted figure continued to change and increased during treatment. One respondent commented that "In the end it was many times the original quote". A number of those interviewed expressed surprise that ACC contributed to other treatment options in addition to implant restorations. Several respondents commented that

in hindsight they would not have progressed with the implant surgery had they been aware of the full cost at the outset of treatment.

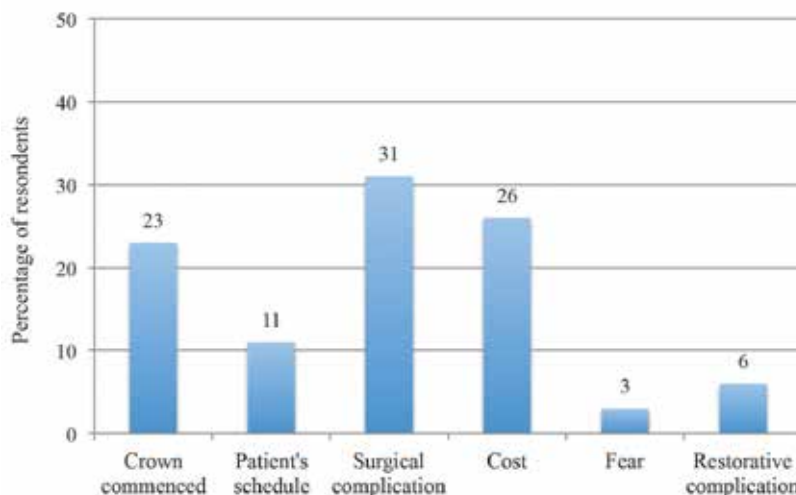
## DISCUSSION

New Zealand is unique in that there are no other accident schemes internationally that cover a whole population for rehabilitation following injury. While there are studies that investigate patient satisfaction following single implant therapy, there are, to our knowledge, no studies exclusively investigating patient satisfaction with dental implants to replace teeth following trauma (Buch et al. 2002; Levi et al. 2003; Vermylen et al. 2003; Al-Hamdan and Haneen 2007; McGrath and Lang 2012; Moghadam et al. 2012).

Other studies have recorded higher levels of patient satisfaction for dental implants in the aesthetic zone than were found in this survey (Vermylen et al. 2003; Al-Hamdan and Haneen 2007; den Hartog et al. 2008; Moghadam et al. 2012). This may reflect how the ratings were assessed as, without standardisation of measurements, there is no consistent way to compare results with any real confidence. The concerns raised by those in this NZ study who were satisfied, but had qualifications to their satisfaction, are similar to other studies relying on patient self-reporting (Andersson et al. 2003; Schropp et al. 2004; Annibali et al. 2010; den Hartog et al. 2008; Cho et al. 2010; Suphanantachat et al. 2012). As in other published studies, it has been suggested that if patients understood more about the treatment required prior to tooth replacement with a dental implant-supported restoration, they may not have gone ahead with treatment (Chang et al. 1999; Vermylen et al. 2003). Although Chang et al. (1999) suggested that patients rate their aesthetic satisfaction higher than do their clinicians, there does seem to be a statistically significant correlation between patients' aesthetic perceptions and dentists' perceptions of the anterior tooth (Cho et al. 2010). This could suggest that, while some cases genuinely need to be remediated, there are also those patients who have unrealistic expectations for which there is no clinical answer.

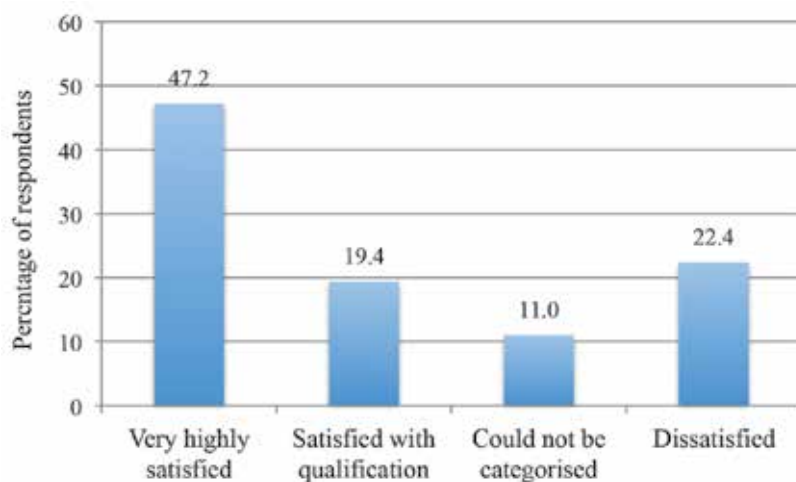
Although the self-reported comments from this survey demonstrated inconsistencies when tested against invoicing data held by ACC, this information still had value in improving both processes and procedures to support patients and clinicians when treatment planning options for tooth replacement using dental implants. This study established a greater understanding of ACC clients' perceptions of treatment outcomes and of services funded by ACC. The perceptions and expectations of the providers (dentists providing the restorations and surgeons) were not explored in this study and investigation of this could further inform management guidelines for ACC.

Some respondents did not feel that they had made an informed decision regarding implant treatment, and it has been suggested that psychometric testing to determine patient



**Figure 3.** Barriers to completion of treatment for those respondents who had not completed implant restoration (n=35)

*Note: The sum of the responses does not equal 100% because more than one response was permitted.*



**Figure 4.** Reported levels of patient satisfaction following implant therapy.

commitment to treatment may improve this outcome (Levi et al. 2003). In other medical treatment domains, patient decision tools are being used to enable shared decision making between clinicians and patients (Barry and Coulter 2010; Brownlee et al. 2011). Some of the identified impediments to completion of the implant treatment in the present survey could be included in a patient decision tool formulated to assist with this process. The longer time frames required for the completion of treatment where surgical dental implant placement and subsequent restoration are required, need to be more fully understood by patients at the outset of care (Chang et al. 1999).

Although the co-payment of fees was not the predominant barrier to restoration completion in this study, it was identified that some clients relied on parents to cover the co-payment. This may reflect the profile of clients managed by ACC for dental injury, many of whom are under 30 years of age. The majority of facial fractures in New Zealand, which may also result in tooth loss, occurred in males (79%), with the peak injury rates (both males and females), coinciding with the legal alcohol purchasing age (Adsett et al. 2013). There was a higher incidence of maxillofacial and dental injuries in

the 16-25 year age group of patients treated at the University of Otago School of Dentistry than in other age groups, with a male to female ratio of 2:1 (Love and Ponnambalam 2008).

Data on the gender of patients with incomplete restoration was of interest, with fewer males than females having completed treatment in all age groups. In NZ adults, lower dental attendance rates have been reported among males (New Zealand Ministry of Health 2010), with more females shown to be "long-term routine attenders" (Thomson et al. 2010).

This study found that there was a time lag of up to four months between the completion of the restoration of an implant and the information from the clinician being processed by ACC. A number of restorations were found during this study that had not, as yet, been invoiced. This exaggerated the level of implants that had failed to progress to restoration as of 23 September 2009. When data was reviewed in August 2012, there were 244 implant surgeries that had occurred between 23 February and 23 September 2009 for which ACC had not received an invoice for the completed restoration. Possible reasons for this may include administrative delay, a very mobile young client base with some having left NZ, or complications related to surgery or healing that delayed treatment completion.

There was the perception for a small group of respondents in this study that "nobody seemed to want to resolve the situation" if there was a problem with the implant treatment following the completion of payment to the clinician by ACC. For other clients, the fact that they had incurred little personal cost for treatment may have reduced their motivation or ownership of the implant therapy and therefore reduced their desire to achieve a definitive restorative outcome. It was also reported that some respondents were "just happy" with the provisional crown or denture provided as part of interim treatment. Identifying those individuals who value an intact dentition, and would work to maintain this, could be viewed as an important factor in providing satisfactory outcomes for complex restorative care.

More specific ACC selection criteria have been implemented since this survey was undertaken, and initial assessment has indicated improvement in the proportion of clients progressing to treatment completions since January 2011. While the co-payment for the crown did not appear to be a barrier to completion of implant therapy, carrying out a survey

of clinicians would help to clarify the barriers to, and delays in, treatment completion and identify additional methods of support including decision tools that may be of value in the treatment process.

## CONCLUSION

This study provided a valuable insight into the processes and procedures of implant therapy from the perspective of clients of ACC and identified that overall satisfaction with the treatment provided was high. Where there was dissatisfaction, this may have been related to the initial process for assessment of the patient and their treatment needs. A patient decision tool may help clients to have more ownership of their treatment options when their decisions are made in partnership with the dentist. This could improve client satisfaction, identify those individuals who are not committed to complex treatment, and better match expectations with realistic treatment goals.

## REFERENCES

- Adsett L, Thomson WM, Kieser JA, Tong DC (2013). Patterns and trends in facial fractures in New Zealand between 1999 and 2009. *NZ Dent J* 109: 142-147.
- Al-Hamdan KS, Haneen M (2007). Patient's satisfaction with dental implants in Riyadh, Saudi Arabia. *Saudi Dent J* 19: 91-96.
- Andersson L, Emami-Kristiansen Z, Hogstrom J (2003). Single-tooth implant treatment in the anterior region of the maxilla for treatment of tooth loss after trauma: a retrospective clinical and interview study. *Dent Traumatol* 19: 126-131.
- Annibali S, Vestri AR, Pilotto A, La Monaca G, Di Carlo S, Cristalli MP (2010). Patient satisfaction with oral implant rehabilitation: evaluation of responses to a questionnaire. *Ann Stomatol(Roma)* 1: 2-8.
- Barry M, Coultar A (2010). Salzburg Global Seminar, The Salzburg Statement on Shared Decision Making Health and Healthcare Seminar Series II. The Greatest Untapped Resource in Healthcare? Informing and Involving Patients in Decisions about Their Medical Care 12 Dec-17 Dec, Session 477.



- Brownlee S, Wennberg J, Barry M, Fisher E, Goodman D, Bynum J (2011). Improving patient decision-making in health care: a 2011 Dartmouth Atlas report highlighting Minnesota. *The Dartmouth Institute for Health Policy and Clinical Practice*.
- Buch RS, Weibrich G, Wegener JW (2002). Patient satisfaction with dental implants. *Mund Kiefer Gesichtschir* 6: 433-436.
- Chang M, Odman OP, Wennström JL, Andersson B. (1999). Esthetic outcome of implant-supported single-tooth replacements assessed by the patient and by the prosthodontist. *Int J Prosthodont* 12: 335-341.
- Cho HL, Lee JK, Um HS, Chang BS (2010). Esthetic evaluation of maxillary single-tooth implants in the esthetic zone. *J Periodontal Implant Sci* 40: 188-193.
- den Hartog L, Huddleston Slater JJR, Vissink A, Meijer HJA, Raghoobar GM (2008). Treatment outcome of immediate, early and conventional single-tooth implants in the aesthetic zone: a systematic review to survival, bone level, soft-tissue, aesthetics and patient satisfaction. *J Clin Periodontol* 35: 1073-1086.
- Levi A, Psoter WJ, Agar JR, Reisine ST (2003). Patient self-reported satisfaction with maxillary anterior dental implant treatment. *Int J Oral Maxillofac Implants* 18: 113-120.
- Love RM, Ponnambalam Y (2008). Dental and maxillofacial skeletal injuries seen at the University of Otago School of Dentistry, New Zealand 2000-2004. *Dent Traumatol* 24: 170-176.
- Martin JR (2003). Establishment of the Accident Compensation Commission 1973: Administrative Challenges. *Victoria U. Wellington L. Rev.*, 34, 249.
- McGrath CLO, Lang N (2012). An evidence-based review of patient-reported outcome measures in dental implant research among dentate subjects. *J Clin Periodontol* 39(S12): 193-201.
- Ministry of Business Innovation and Employment (2001). Accident Compensation Act 2001
- Public Act 2001 No 49
- Moghadam M, Dias R, Kuyinu E, Ferguson MB, Mucciolo T, Jahangiri L (2012). Predoctoral fixed implant patient satisfaction outcome and challenges of a clinical implant competency. *J Dent Educ* 76: 437-442.
- New Zealand Ministry of Health. (2010). *Our Oral Health: Key findings of the 2009 New Zealand Oral Health Survey*. Wellington: Ministry of Health.
- Schropp L, Isidor F, Kostopoulos L, Wenzel A (2004). Patient experience of, and satisfaction with, delayed-immediate vs. delayed single-tooth implant placement. *Clin Oral Implants Res* 15: 498-503.
- Suphanantachat S, Thovanich K, Nisapakultorn K (2012). The influence of peri-implant mucosal level on the satisfaction with anterior maxillary implants. *Clin Oral Implants Res* 23: 1075-1081.
- Thomson WM, Williams SM, Broadbent, JM, Poulton R, Locker D (2010). Long-term dental visiting patterns and adult oral health. *J Dent Res* 89: 307-311.
- Vermylen K, Collaert B, Linden U, Bjorn AL, De Bruyn H (2003). Patient satisfaction and quality of single-tooth restorations. *Clin Oral Implants Res* 14: 119-124.

#### DETAILS OF AUTHORS

- Rosemary Kennedy Dip Adv SDN MBA  
Dental Adviser, Accident Compensation Corporation, Wellington, 6140, New Zealand.
- Colleen M Murray BChD(Hons), BDS, PGDipClinDent, BEd  
Department of Oral Rehabilitation, Sir John Walsh Research Institute, Faculty of Dentistry, University of Otago
- Jonathan W Leichter BA, DMD, Cert Perio (*corresponding*)  
Department of Oral Sciences, Sir John Walsh Research Institute, Faculty of Dentistry, University of Otago, jonathan.leichter@otago.ac.nz