Identifying and exploring physical and psychological morbidity and patient and family caregiver resilience following acute wound development and/or wound blistering post orthopaedic surgery: a systematic review

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Identifying and exploring physical and psychological morbidity and patient and family caregiver resilience following acute wound development and/or wound blistering post orthopaedic surgery: a systematic review

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Abstract

The aim of this article was to identify the literature that examined and explored physical and psychological morbidity and patient and family caregiver resilience following acute wound development and/or wound blistering post orthopaedic surgery. A systematic review of the literature using the databases MEDLINE, CINAHL and EMBASE was undertaken. The papers were examined using title and abstract for relevance to the primary and secondary outcomes. The primary outcome of interest was family caregiver resilience following acute wound development and/or wound blistering post orthopaedic surgery. The search yielded 275 records after removing any duplicates; eight studies were considered eligible and were reviewed as full text. Following full review, none of the studies was included in this article. To conclude, there were no papers that investigated or examined the concept of resilience in relation to the management of acute post-surgical orthopaedic wounds. Four of the papers identified, following the review process, did discuss quality of life outcomes and how these may be improved following wound development; most papers focused on the management of chronic wounds. It is apparent from the review that there is no evidence currently available that explores patient and family caregiver resilience following acute wound development and/or wound blistering post orthopaedic surgery.

Introduction

There is a plethora of research, evidence and discussion surrounding the quality of life issues relating to the management and treatment of chronic wounds, yet surprisingly very little regarding acute orthopaedic postoperative wound management, especially in relation to psychological morbidity and resilience. For the purpose of this research, resilience is defined as 'self-righting capabilities, transcending the negative impact of illness' (1,2). This clinical concern may be attributed to a range of reasons including the economic burden associated with chronic wound management (3) and the fact that in industrialised countries, approximately 1% of the population is reported to be suffering from a chronic non healing

Key Messages

- patients discharged to a community environment with an acute wound are at risk of developing postoperative wound complications, including blistering and infection
- caregivers are not prepared for the caring role and there is mounting evidence that people who care for loved ones with chronic conditions are at risk of physical, mental and emotional conditions/disorders themselves
- there is no evidence currently available that explores patient and family caregiver resilience following acute wound development and/or wound blistering post orthopaedic surgery

wound (4,5). However, a substantial proportion of acute hospital beds are occupied by patients with wounds (6) who will require the professional services of health care practitioners to manage the wound on discharge to the community. Interestingly, Posnett *et al.* (5) identified that proper wound care is important because any wound is at risk of bacterial contamination, which inhibits the healing process and prevents wound closure. Patients discharged to a community environment with an acute wound, for example, following orthopaedic surgery, are at risk of developing postoperative wound complications, including blistering and infection. Superficial wound problems such as blistering can prolong length of stay, can negatively impact on morbidity and can impact on the individual's health-related quality of life (HRQoL) perceptions (7). The incidence of superficial wound problems, such as skin blistering, is a commonly reported problem, especially in orthopaedic surgery (8) with postoperative blistering occurring in 6–24% of all orthopaedic patients (depending upon dressing used) (7), which can be a cause of increased pain, delayed healing and increased susceptibility to wound infection (9).

Furthermore, post-orthopaedic surgical wounds potentially have other costs in addition to impacting on HRQoL, such as increasing rehospitalisation rates, and health care costs (in some cases by more than 300%) (10). In the context of discharge planning and care arrangement post discharge, family caregivers have a significantly increased role. Some family caregivers experience carer burden attached to the caring role especially when their family member develops post-procedure physical and/or psychological morbidity that can impact upon quality of life and social factors, for example, the stigma attached to exudating or malodorous wounds. A caring relationship sets up the conditions of trust that enable the one receiving the care to accept the help offered. In other words, caring is a mutual relationship (11). The term caregiver burden has been used as a term that refers to the financial, physical and emotional effects of caring. Carer burden has received attention in the wider literature on family caregiving (11–14); however, little attention has been given to those who care for orthopaedic patients who develop psychological and physical morbidity post surgery, and their experiences of being resilient in this context.

This study was performed to systematically search, critically appraise and summarise randomised controlled trials (RCTs) and non-RCTs assessing the physical and psychological morbidity and patient and family caregiver resilience following acute wound development and/or wound blistering post orthopaedic surgery.

Type of participants

This review included any type of patient in any health care setting with an acute orthopaedic wound and/or wound blistering. Each study had to report, at a minimum, one of the following outcome measures:

The primary outcomes of interest were family caregiver resilience following acute wound development and/or wound blistering post orthopaedic surgery, incidence of wound blistering following orthopaedic surgery, readmission rates to an acute health care facility following wound complications and quality of life deterioration. The secondary outcomes were adverse events and costs.

The inclusion criteria were papers written in English, papers published up to 2012, acute wounds and non infected wounds, and the exclusion criteria were papers not written in English, chronic wounds and infected wounds.

Search strategy

A search was undertaken using the databases MEDLINE, CINAHL and EMBASE. The papers were examined using title and abstract for relevance to the primary and secondary outcomes.

Selection of studies

Two reviewers (KO and KE) read all titles and abstracts resulting from the search process and eliminated any studies that were not relevant for this review. The papers selected for full review were examined using an extraction tool with face validity developed by the researchers. Full copies of all potentially relevant studies were obtained. Both reviewers acted independently to classify these as include or exclude studies. Any discrepancy about the relevance and design of the studies between the reviewers was resolved by discussion, and the decision to include the studies was based upon the inclusion criteria. Consensus was sought by the reviewers when differences in opinion occurred and was resolved by discussion.

Results

The search yielded 275 records, which were screened by reading both the title and the abstracts. After removing any duplicates, eight studies were considered eligible and were reviewed as full text. Following full review, none of the studies was included in this review. The reasons for exclusion were study design, not in the inclusion criteria of this review or not on patient and family carer perspectives following acute wound development and/or wound blistering post orthopaedic surgery. However, we have summarised the characteristics and main outcomes of the excluded studies to aid the discussion for this review (Tables 1 and 2).

Discussion

The impact of living with an acute or chronic wound is complex, with individuals focussing on different priorities such as reducing pain or odour, covering up unsightly strikethrough or concerns about wearing bulky dressings that prevent them from wearing items of clothing or shoes, or performing daily activities (15). Patients with wounds experience physical problems (pain, odour and bleeding), social concerns, emotional stress and functional complications. These changing priorities can also affect families and/or carers whereby the family or carers have to change their own routines to meet the changing needs of the individual with a wound. It is estimated that over 44 million Americans are in caregiver roles that are unpaid

Table 1 Excluded studies including reason for exclusion

References	Title	Reason for exclusion
Jameson *et al.* (50)	Complication following anterior cruciate ligament reconstruction in the English NHS	Excluded as the study did not address the patient and family carer perspectives
Pilot *et al.* (51)	Experience in the first 4 years of rapid recovery: is it safe?	Excluded as the study did not address the patient and family carer perspectives
Roberts *et al.* (52)	Reducing the pain: a systematic review of postdischarge analgesia following elective orthopedic surgery	Excluded as the study design was not in the inclusion criteria: systematic review article
Kennedy *et al.* (53)	Quality indicators in paediatric surgery: a systematic review	Excluded as the study design was not in the inclusion criteria: systematic review article
Castillo *et al.* (54)	Orthopaedic clinical research: is a 2-year follow-up necessary?	Excluded as the study did not address the patient and family carer perspectives
Day *et al.* (55)	Surgical outcomes of a randomised prospective trial involving patients with a proximal femoral fracture	Excluded as the study did not address the patient and family carer perspectives
Goodridge *et al.* (56)	Quality of life of adults with unhealed and healed diabetic foot ulcers	Excluded as the study did not address the patient and family carer perspectives
White and Jeffrey (57)	The hierarchy of evidence: is wound care generalisable?	Excluded as the study design was not in the inclusion criteria: editorial

with the value of this unpaid labour being estimated at $306 billion (US) and nursing home care $115 billion (US) (16). In Australia, 2·6 million people were estimated to be providing unpaid care in 2005 with over one in eight Australians caregivers who provided most of the care (1). There are over 6 million carers in the UK who provide unpaid care to someone who is ill, frail or disabled (17). This contribution to care accounts for £199 billion annually, which is more than that the annual expenditure of the National Health Service that costs £98·8 billion (2009–2010 prices) according to Public Expenditure (2010). This figure equates to £2·3 billion per week, £326 million per day, £13·6 million per hour or £18 473 for every carer in the UK (17). Means-tested benefits for carers are found mostly in English-speaking countries (Australia, Ireland, New Zealand and the UK). However, often caregivers are not prepared for the caring role and there is mounting evidence that people who care for loved ones with chronic conditions are at risk of physical, mental and emotional conditions/disorders themselves (18–21). Indeed, Buckner and Yeandle (17) reported that carers do find the role to be rewarding as they believed they were giving relatives or loved ones the best care possible with the role providing a strong sense of family, community and friendship. However, the role of caregiver led to one in five carers having to give up their work (22) that in turn led to financial hardship (23).

For some persons, caring is *self-supported* because of poor social and familial networks. The OECD (24) reported that the number of lone-elderly households had increased between 1990 and 2000 across OECD countries (except New Zealand, the UK and the USA). Surprisingly, these households now included countries with a tradition of strong family ties, such as southern European and far-east Asian countries. In the USA, Stone (25) estimated that 1·2 million people aged 65 and above would be living alone and have no living children or siblings in 2020, compared to 682 000 in 1990. In the UK, the number of people needing care will outstrip the number of people able to provide that care within the next 3–4 years (26). This figure is alarming and has been attributed to an ageing population, smaller family size and geographic localities, all of which have an effect on individuals receiving care and the country's economy. If the amount of informal caregivers rises then the amount of people able to participate in paid employment will fall; conversely, if the number of informal caregivers decreases then there will be an increase in demand for an already resource-limited health and social care service.

There has been an abundance of research undertaken exploring living with a chronic wound and its impact on HRQoL, yet little investigation into the impact of an acute wound on the possible psychological impact this may have on patients and carers' quality of life, or their resilience in living with a wound. This may be owing to a variety of reasons including, most people with an acute wound are discharged home to recuperate and have little contact with health professionals and most acute wounds follow the normal healing trajectory and do not cause any problems. Nevertheless, individuals with an acute wound have to 'learn to live' with an area of their body that has been injured and may cause pain and reduce mobility. Furthermore, there is a possibility that the dressing that is being used to protect the wound may damage the periwound area leading to the development of blisters. It is therefore essential that the importance of maintaining a feeling of well-being and a positive quality of life for those patients with an acute wound is promoted. The International consensus document: *Optimising wellbeing in people living with a wound* (15) identified that many patients with a wound discussed a need to have control over their lives through, for example, taking photographs of their wounds to keep up to date with their progress. The service users involved in this document also discussed that having access to the right equipment and products that fitted with their lifestyle was important in helping them to manage their wounds at home. They highlighted that limited access to appropriate hospital care and equipment was often a frustration and reduced their feelings of general well-being.

Upton *et al.* (27) in their exploratory study of practitioner perspectives relating to prevalence of stress anxiety and mood disorders in patients with acute and chronic wounds concluded that patients experience a lack of control over their wound treatment because of the restriction of activities of daily living

Table 2 Characteristics of the study and main conclusion for excluded studies

References	Characteristics	Main conclusion
Jameson *et al.* (50)	Study design: retrospective audit Number of patients: 13 938 Mean age: 29·3 (8–83) years Gender Men: 11 084 Women: 2854 Management: Retrospective data on outcomes Outcomes: Venous thromboembolism (VTE), readmission and infection following anterior cruciate ligament (ACL) reconstruction.	Infection rates were low. Readmission rate varied with several units having higher than expected rates. Contrary to belief risk for VTE following ACL was small.
Pilot *et al.* (51)	Study design: prospective cohort study Number of patients: 611 Mean age: 66·3 ± 9·3 (24–86) years Gender Men: 196 Women: 415 Management: Routine treatment using joint care clinical pathway including intensified rehabilitation. Outcomes: Length of stay, wound complications/infection, readmission rate and reevaluation of wound and cardiac events.	Joint care pathway for total hip replacement is both effective and safe offering a considerable reduction in length of hospital stay and improved clinical outcomes. However, wound management should be continuously done on an outpatient basis in order to achieve optimum healing and rapid recovery.
Roberts *et al.* (52)	Study design: review Excluded because of Oxford Quality score being used in the study thus picked up by database.	
Kennedy *et al.* (53)	Study design: review – quality indicators (QIs) Result: Most cited indicator was mortality. Second most cited was a postoperative complication. Reoperation and readmission were the next most frequent. Cost effectiveness was notably absent. Patient-centred outcomes capture the impact of a patients' overall well-being much better than surgical outcomes.	Mortality and postoperative complication were the most cited QIs. Patient-centred QIs appear to be the most useful tools, although their use is somewhat limited in the published literature.
Castillo *et al.* (54)	Study design: prospective clinical study Number of patients: 336 Mean age: between 16 and 69 years Gender Not reported Management: Evaluation of changes in recovery in patients as part of Lower Extremity Assessment Project. Outcomes: Medical complication, clinical recovery and functional recovery. Evaluate the extent to which new complications are observed beyond 1 year, and the degree to which complications resolved during the first year and those resolved during the second year have upon functional outcomes. Follow-up beyond 1 year is difficult and expensive. One-year data were sufficient to address changes in recovery.	Long-term follow up provides more comprehensive profiles of patients; however, it accounts for 20% of the total cost. One-year data were sufficient in addressing major issues.
Day *et al.* (55)	Study design: RCT Number of patients: not reported Mean age: not reported; however, at least 55 years old. Gender Not reported	Early intervention for elderly non nursing home proximal femur fracture patients could achieve lower levels of postoperative complications, morbidity and mortality.

Table 2 Continued

References	Characteristics	Main conclusion
	Management: Early intervention including accelerated rehabilitation. Outcomes: Postoperative narcotic analgesia, stroke or emboli: higher in intervention group. Deep wound infection: no difference Rate of chest infection, cardiac problem and bedsore: higher in standard care group. Mean length of stay: lower in the intervention group.	Early intervention for elderly non nursing home proximal femur fracture patients could achieve lower levels of postoperative complications, morbidity and mortality.
Goodridge et al. (56)	Study design: cross-sectional comparative study Number of patients: 104 Mean age: 64 ± 10 (45–86) years Gender Men: 71 Women: 33 Management: Adult diabetic foot ulcer (57 unhealed ulcers and 47 healed ulcers) Outcome: Quality of life score (SF12) and Cardiff Wound Impact Scale (CWIS). Patients with unhealed ulcers had a significantly worst physical health score (PHS). Patients with unhealed ulcers also reported emotional problems, which limited activities and social life, and contributes to frustration and anxiety.	SF12 and CWIS provided evidence in support that the presence of unhealed diabetic foot ulcers has a negative impact on quality of life. Every effort should be made to provide services and equipment to improve QoL.
White and Jeffrey (57)	Discussion on randomised controlled trials in wound care/management. Good clinical multifaceted criteria could be a better approach to the evaluation of health care system.	Hierarchy of evidence is crucial for the future of wound care management.

and routines over a period of time. They suggested that the majority of patients with a wound, acute or chronic, would experience a mood and/or and anxiety disorder and this in turn would increase the cost of wound care. Indeed, Marucha *et al.* (28) and Ebrecht *et al.* (29) had previously demonstrated that mood disorders could negatively impact patient well-being and lead to delayed wound healing. Upton *et al.* (27) recommended that there should be routine assessment of pain levels and mood disorders to help improve the quality of life and reduce the expenditure on wound care.

The studies surrounding the importance of positive psychological well-being (30,31) have identified that feelings of joy, happiness and energy, as well as characteristics such as life satisfaction, hopefulness, optimism and a sense of humour are associated with reduced risk of mortality in healthy populations. Indeed, Nelson (32) reporting on the management of chronic leg ulcers highlighted that laughter could assist in the healing process. She suggested that this was caused by laughing encouraging the diaphragm to move and therefore moving blood around the body. The physiological aspects of emotions and how they can affect bodily reactions have been investigated by Kiecolt-Glaser *et al.* (33) who concluded that negative emotions can increase the production of proinflammatory cytokines that can increase the risk of wound infection and therefore delay wound healing.

These positive and self-righting capabilities are qualities found in resilient individuals. Garmezy (34) played a pioneering role in the study of resilience, and this research has greatly expanded the current focus of social and behavioural sciences to include not only the study of risk, deficit and illness but also self-righting capacities (35). The belief resilience is a strategy (such as skills in problem solving) that can be modelled and mastered through education, and was a key finding in a number of studies (36–49). Exposure to adverse situations (such as living with an acute or chronic wound) can offer an opportunity for learning or enhancing resilience through life experience, and exploration of resilience could offer a basis for clinical interventions with the potential to prevent poor or adverse client outcomes.

Summary

It was apparent from this systematic review that there is no evidence available at this time that explores patient and family caregiver resilience following acute wound development and/or wound blistering post orthopaedic surgery. Given the real risks of carer burden and psychological morbidity for patients, it is essential that practitioners understand how to promote well-being, understand resilience and be able to implement measures that support patients and carers when living with a wound. There needs to be clear guidelines

developed on how health and social care practitioners can meet the needs of these patients and their caregivers. Participation and involvement of patients and caregivers in the development of the guidelines are essential to ensure that the patient and their caregivers are at the centre of care and guidelines for care. Finally, there is a gap in the evidence base related to the exploration of resilience for this patient group (including their carers) and knowledge of this may well present a basis for clinical interventions with the potential to prevent adverse clinical outcomes.

Recommendations

The recommendations from this systematic review include the following:

- Undertake research exploring physical and psychological morbidity and patient and family caregiver resilience for those who experience acute and chronic wounds.
- Develop guidelines related to patient and carer involvement in wound management post discharge from hospital.
- Participation of patients and caregivers in the development of guidelines related to patient and carer involvement in wound management post discharge from hospital.

References

1. Access Economics Pty Limited. *The economic value of informal care*. Kingston: Access Economics, 2005.
2. Edward K, Welch A, Chater K. The phenomenon of resilience as described by adults who have experienced mental illness. *J Adv Nurs* 2009;**65**:587–95.
3. Gottrup F, Apelqvist J. The challenge of using randomized trials in wound healing. *Br J Surg* 2010;**97**:303–4.
4. Gottrup F. Optimizing wound treatment through health care structuring and professional education. *Wound Repair Regen* 2004;**12**:129–33.
5. Posnett J, Gottrup F, Lundgren H, Saal G. The resource impact of wounds on health-care providers in Europe. *J Wound Care* 2009;**18**:154.
6. Mahé E, Langlois G, Baron G, Girard LL, Macrez A, Fargeot C, Crickx B. Results of a comprehensive hospital-based wound survey. *J Wound Care* 2006;**15**:381–4.
7. Ousey K, Gillibrand W, Stephenson J. Achieving international consensus for the prevention of orthopaedic wound blistering: results of a Delphi survey. *Int Wound J* 2012; doi:10.1111/j.1742-481X.2012.00965.x.
8. Cosker T, Elsayed S, Gupta S, Mendonca AD, Tayton KJ. Choice of dressing has a major impact on blistering and healing outcomes in orthopaedic patients. *J Wound Care* 2005;**14**:27–9.
9. Gupta S, Lee S, Moseley L. Postoperative wound blistering: is there a link with dressing usage? *J Wound Care* 2002;**11**:271–3.
10. Whitehouse JD, Friedman ND, Kirkland KB, Richardson WJ, Sexton DJ. The impact of surgical-site infections following orthopedic surgery at a community hospital and a university hospital: adverse quality of life, excess length of stay, and extra cost. *Infect Control Hosp Epidemiol* 2002;**23**:183–9.
11. Munro I, Edward KL. The burden of care of gay male carers caring for men living with HIV/AIDS. *Am J Mens Health* 2010;**4**:287.
12. Woods B. Promoting well-being and independence for people with dementia. *Int J Geriatr Psychiatry* 1999;**14**:97–109.
13. Aoun SM, Kristjanson LJ, Currow DC, Hudson PL. Caregiving for the terminally ill: at what cost? *Palliat Med* 2005;**19**:551–5.
14. Hudson PL, Hayman-White K, Aranda S, Kristjanson LJ. Predicting family caregiver psychosocial functioning in palliative care. *J Palliat Care* 2006;**22**:133–40.
15. Optimising wellbeing in people living with a wound: an expert working group review. 2012. URL www.woundsinternational.com [accessed on 5 October 2012]
16. National Alliance for Caregiving. *Caregiving in the US: a focused look at those caring for someone age 50 or older*. Bethesda: National Alliance for Caregiving, 2009.
17. Buckner L, Yeandle S. *Valuing carers 2011; calculating the value of carers' support*. London: Carers UK, 2011.
18. Levine C. *Always on call: when illness turns families into caregivers*. Nashville: Vanderbilt University Press, 2004.
19. Pinquart M, Sörensen S. Differences between caregivers and noncaregivers in psychological health and physical health: a meta-analysis. *Psychol Aging* 2003;**18**:250–67.
20. Schulz R, O'Brien AT, Bookwala J, Fleissner K. Psychiatric and physical morbidity effects of dementia caregiving: prevalence, correlates, and causes. *Gerontologist* 1995;**35**:771–91.
21. Vitaliano PP, Echeverria D, Yi J, Phillips PEM, Young H, Siegler IC. Psychophysiological mediators of caregiver stress and differential cognitive decline. *Psychol Aging* 2005;**20**:402.
22. IPSOS. One million give up work to care. 2009. URL http://www.ipsos-mori.com/researchpublications/researcharchive/2526/One-million-give-up-work-to-care.aspx [accessed on 5 October 2012]
23. Carers UK. *Carers in crisis: a survey of carers' finances in 2008*. London: Carers UK, 2008.
24. Fujisawa R. The long-term care workforce: overview and strategies to adapt supply to a growing demand. 2009. URL http://www.oecd-ilibrary.org/social-issues-migration-health/the-long-term-care-workforce-overview-and-strategies-to-adapt-supply-to-a-growing-demand_225350638472 [accessed on 24 September 2012]
25. Stone RI. *Long-term care for the elderly with disabilities: current policy, emerging trends, and implications for the twenty-first century*. New York: Milbank Memorial Fund, 2000.
26. Pickard L. *Informal care for older people provided by their adult children: projections of supply and demand to 2041*. London: Personal Social Services Research Unit, 2008, PSSRU discussion paper, 2515.
27. Upton D, Hender C, Solowiej K. Mood disorders in patients with acute and chronic wounds: a health professional perspective. *J Wound Care* 2012;**21**:42–8.
28. Marucha PT, Kiecolt-Glaser JK, Favagehi M. Mucosal wound healing is impaired by examination stress. *Psychosom Med* 1998;**60**:362–5.
29. Ebrecht M, Hextall J, Kirtley LG, Taylor A, Dyson M, Weinman J. Perceived stress and cortisol levels predict speed of wound healing in healthy male adults. *Psychoneuroendocrinology* 2004;**29**:798–809.
30. Chida Y, Steptoe A. Positive psychological well-being and mortality: a quantitative review of prospective observational studies. *Psychosom Med* 2008;**70**:741–56.
31. Diener E, Chan MY. Happy people live longer: subjective well-being contributes to health and longevity. *Appl Psychol: Health Well-Being* 2011;**3**:1–43.
32. Nelson E. Laughter really is the best medicine for leg ulcers. 2011. URL http://www.leeds.ac.uk/news/article/1559/laughter_really_is_the_best_medicine_for_leg_ulcers [accessed on 5 October 2012]
33. Kiecolt-Glaser JK, McGuire L, Robles TF, Glaser R. Emotions, morbidity, and mortality: new perspectives from psychoneuroimmunology. *Annu Rev Psychol* 2002;**53**:83–107.
34. Garmezy N. Stress-resistant children: the search for protective factors. In: Stevenson JE, editor. *Recent research in developmental psychopathology*. Journal of Child Psychology and Psychiatry, Book Supplement Number 4. Oxford: Pergamon, 1985:213–33.
35. Werner E, Smith R. *Vulnerable but invincible*. New York: Adams, Bannister & Cox, 1982.

36. Benard B. Fostering resilience in kids. *Educ Leadership* 1993:44–8.
37. Garmezy N. Children in poverty: resilience despite risk. *Psychiatry* 1993;**56**:127–36.
38. Radke-Yarrow M, Brown E. Resilience and vulnerability in children of multiple-risk families. *Dev Psychopathol* 1993;**5**:581–92.
39. Westfall A, Pisapia J. *At-risk students: who are they and what helps them succeed? Research Brief #17*. Richmond: Metropolitan Educational Research Consortium, 1994.
40. Benard B. *Turning it around for all youth: from risk to resilience (ERIC/CUE Digest No. 126)*. Washington: Office of Educational Research and Improvement (ED), 1997.
41. Christiansen J, Christiansen JL, Howard L. Using protective factors to enhance resilience and school success for at-risk students. *Interv Sch Clin* 1997;**33**:86–9.
42. Pryjmachuk S. Resilience was not necessarily a healthy concept for adolescents in inner city vocational high schools. *Evid Based Ment Health* 2000;**3**:62.
43. McDonald J, Hayes L. Promoting resilience in young people: progress in implementing a framework in schools. *Health Promot J Austr* 2001;**12**:261–4.
44. Todis B, Bullis M, Waintrup M, Schultz R, D'Ambrosio R. Overcoming the odds: qualitative examination of resilience among formerly incarcerated adolescents. *Except Children* 2001;**68**:119–39.
45. Margalit M. Resilience model among individuals with learning disabilities: proximal and distal influences. *Learn Disabil Res Pract* 2003;**18**:82.
46. Tusaie K, Dyer J. Resilience: a historical review of the construct. *Holist Nurs Pract* 2004;**18**:3–10.
47. Edward K. The phenomenon of resilience in crisis care mental health clinicians. *Int J Ment Health Nurs* 2005;**14**:142–8.
48. Edward K, Warelow P. Resilience: when coping is emotionally intelligent. *J Am Psychiatr Nurses Assoc* 2005;**11**:101–2.
49. Edward K. Resilience: a protector from depression. *J Am Psychiatr Nurses Assoc* 2005;**11**:241–3.
50. Jameson SS, Dowen D, James P, Serrano-Pedraza I, Reed MR, Deehan D. Complications following anterior cruciate ligament reconstruction in the English NHS. *Knee* 2012;**19**:14–9.
51. Pilot P, Bogie R, Draijer WF, Verburg AD, Van Os JJ, Kuipers H. Experience in the first four years of rapid recovery; is it safe? *Injury* 2006;**37**:S37–40.
52. Roberts M, Brodribb W, Mitchell G. Reducing the pain: a systematic review of postdischarge analgesia following elective orthopedic surgery. *Pain Med* 2012;**13**:711–27.
53. Kennedy A, Bakir C, Brauer CA. Quality indicators in pediatric orthopaedic surgery: a systematic review. *Clin Orthop Relat Res* 2012;**470**:1124–32.
54. Castillo RC, MacKenzie EJ, Bosse MJ. Orthopaedic trauma clinical research: is 2-year follow-up necessary? Results from a longitudinal study of severe lower extremity trauma. *J Trauma* 2011;**71**:1726.
55. Day G et al. Surgical outcomes of a randomized prospective trial involving patients with a proximal femoral fracture. *ANZ J Surg* 2001;**71**:11–4.
56. Goodridge D, Trepman E, Sloan J, Guse L, Strain LA, McIntyre J, Embil JM. Quality of life of adults with unhealed and healed diabetic foot ulcers. *Foot Ankle Int* 2006;**27**:274.
57. White R, Jeffery S. The hierarchy of evidence: is wound care generalisable? *Br J Nurs* 2012;**21**(15-TVS Suppl):3.