Evidence Table

PICO: In pediatric patients with massive burn injuries, do patients who made an early return to pre-burn activities demonstrate higher long-term quality of life than those with delayed return to pre-burn activities?

Abbreviations used: QOL = quality of life; LBM = lean body mass; REE = resting energy expenditure; TBSA = total body surface area; DEXA = dual-energy radiograph absorptiometry; OXEX = oxandrolone and exercise; OX = oxandrolone, EX = exercise

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| Author,  Journal, Year, Title | Purpose and Design | Subjects | Intervention | Outcome Measures and timeframe | Results | Analysis and Conclusions |
| Sheridan et al  JAMA  2000  Long-term outcome of children surviving massive burns. | To evaluate the long-term QOL of children who sustained massive burns.  Cross-sectional | N = 60  42 M, 18 F  mean age at which their burn occurred was 9.8  the mean age at follow-up was 25.9  mean TBSA 81.7% | n/a | SF-36 to assess QOL  Administered 1x via phone interview at an average interval of 15.7 years post-injury. | SF-36 scores were not significantly different from those of the non-burned population. Correlation for higher SF-36 scores were found with subjects who had consitent mutlidisciplinary follow up, family support, and early return to preburn activities. | Normal QOL can be achieved after pediatric massive burn injuries, and having supportive families, consistent multidisciplinary care, and returning to preburn activities early are all predictive of higher long term QOL. |
| Suman et al  J Appl Physiol.  2001  Effects of a 12-wk resistance exercise program on skeletal muscle strength in children with burn injuries. | To assess whether a 12 week exercise training program would improve muscle strength, lean body mass, and capacity to perform work in children who have sustained burn injuries.  RCT | N = 35  Exercise Group:  16 M, 3 F  mean age 10.5  mean TBSA 59.4%  Control:  12 M, 4 F  mean age 11.0  mean TBSA 58.0% | Exercise group:  Hospital rehab program with a 12 wk resistance and aerobic training program  Control group:  Home PT/OT program | Cybex dynamometer measures of peak torque, total work, and average power. REE, LBM by DEXA, VO2max  Initial measures:  6 mo. after injury  post intervention measures:  9 mo. after injury | Peak torque, total work, and average power significantly increased in the exercise group, but not in the non-exercise group. | Resistance and aerobic exercise training is effective in improving strength in pediatric burn pts. |
| Przkora et al  Pediatrics  2007  The effects of oxandrolone and exercise on muscle mass and function in children with severe burns. | To assess the effects of oxandrolone and exercise on LBM, muscle strength, and aerobic capacity in children with severe burns. 4 groups were compared: oxandrolone and exercise, oxandrolone only, exercise and a placebo, and a control which received only a placebo.  RCT | N = 51  OXEX:  13 M, 1 F  mean age 12.1  Mean TBSA 52.1%  OX only:  6 M, 3 F  mean age 11.8  mean TBSA 54.7%  EX and placebo:  13 M, 4 F  mean age 10.9  mean TBSA 55.6%  control:  9 M, 2 F  mean age 11.8  mean TBSA 51.6% | Groups receiving exercise had 12 wks of resistance exercise. Groups receiving oxandrolone took 0.1 mg/kg body weight of this medication orally each day. | Biodex dynamometer measures of peak torque. LBM by DEXA, VO2 max.  Initial measures:  6 mo. after injury  post intervention measures:  9 mo. after injury | The OXEX group showed the greatest gains in lean body mass and muscle strength. All groups showed improvement over the placebo alone group, demonstrating that even oxandralone alone or exercise alone can increase lean mass and muscle strength. | Oxandrolone when used in conjunction with a resistance exercise program can provide greater benefits in LBM and strength than exercise or oxandrolone alone, but in those who cannot perform rigorous exercise, oxandrolone alone is an effective intervention. |
| Al-Mousawi et al  J Burn Care Res.  2010  Effects of exercise training on resting energy expenditure and lean mass during pediatric burn rehabilitation. | To assess the effects of a 12 wk exercise program on REE in children with severe burns.  RCT | N = 21  Exercise group:  9 M, 2 F  mean age 12.2  mean TBSA 61%  Control group:  7 M, 3 F  mean age 13.7  mean TBSA 56% | Exercise group:  Hospital rehab program with 12 wks of resistance and aerobic training  Control group:  Home PT/OT program | Biodex dynamometer measures of peak torque. REE, LBM by DEXA, VO2 max.  Initial measures:  6 mo. after injury  post intervention measures:  9 mo. after injury | The group receiving the exercise program showed significant gains in lean body mass and muscle strength, without demonstrating significant increases in REE. | Exercise does not negatively impact REE or produce hypermetabolism. Exercise training is a safe and effective intervention for this population. |
| Neugebauer et al  J Burn Care Res.  2008  Effects of a 12 week rehabilitation program with music & exercise groups on range of motion in young children with severe burns**.** | To assess the effects of a music and exercise group on AROM and PROM in children with severe burns.  Cohort | N = 24  Music group:  12 M, 3 F  Mean age 3.67  Mean TBSA 61%  Control group:  5 M, 4 F  mean age 3.33  mean TBSA 61% | Music group:  Hospital rehab program with 12 wk group exercise program incorporating music  Control group:  Home PT/OT program | Goniometry measurements of AROM and PROM of elbows and knees  Initial measures:  Taken prior to the beginning of the 12 wk intervention period  Post intervention measures:  Taken at the conclusion of the 12 wk intervention period | The control group had a higher pecentage of participants lose AROM and PROM when compared to the music group, and the music group demonstrated a higher percentage of improvement in AROM and PROM than the control group. | Young children unable to perform resistance exercise can benefit from a group music exercise program to maintain and improve ROM, which is more beneficial than standard PT/OT alone. |
| Baker et al  Arch Phys Med Rehabil  2007  Physical and psychologic rehabilitation outcomes for young adults burned as children. | To provide information on physical and psychologic outcomes in pediatric burn survivors as young adults.  Cross-sectional | N = 83  52 M, 31 F  mean age 21  age range 18-28  mean TBSA 52%  mean # of yrs since burn 14 | n/a | MMT, grip and pinch strength, mobility and stability assessment, ADL performance self-assessment questionnaire developed by Shriners, psychological assessments by psychologists, Quality of Life Questionnaire (QLQ), SF-36  1x measurement performed at least 2 yrs. after injury | They had significantly lower scores in quality of life reported on the QLQ, had a high rate of psychiatric disorder (anxiety disorders the most common form), but had similar SF-36 scores and were able to physically function at a level similar to their non-burned peers. | Most children with moderate to severe burns will be independent with ADLs and mobility in adulthood. This population is in need of psychological care after injury due to the high prevalence of anxiety disorder and decreased QOL. |
| Alloju et al  Burns  2008  Assessment of muscle function in severely burned children. | To assess skeletal muscle catabolism and muscular function in a pediatric population that sustained severe burn injuries.  Case-control | N = 79  Burn group:  25 M, 8 F  mean age 11.8  mean TBSA 56%  Control group:  24 M, 22 F  mean age 12.1  (non-burned) | n/a | Biodex dynamometer measures of peak torque and total work, LBM by DEXA, VO2 max.  1x assessment performed 6 mo. post injury. | Severely burned children demonstrated significantly lower lean body mass, peak torque, and total work capacity than their non-burned peers. | There are significant differences between burned and non-burned pediatric populations, suggesting muscle function impairment persists 6 months post burn. |
| McEntire et al  Pediatric Rehabilitation  2006  Thermoregulation during exercise in severely burned children. | To investigate the relationship between submaximal exercise and body temperature in burned and non-burned children, to determine if there were significant differences in thermoregulation between the populations.  Case-control | N = 30  Burn group:  10 M, 5 F  mean age 13.2  mean TBSA 55.6%  Control group:  10 M, 5 F  mean age: 15.3  (non-burned) | n/a | Tympanic and skin temperature measured by Mon-A-Therm Model 6510  1x assessment performed 6 mo. after injury | No significant differences were found between the groups, suggesting that burned populations are able to submaximally exercise at comparable body temperatures as their non-burned peers. | Exercise at moderate intensity is a safe intervention when conducted at room temperature in children with burn injuries affecting less than 75% TBSA. |
| Schneider et al  J Burn Care Res.  2006  Contractures in burn injury: defining the problem. | To determine the incidence of contractures and most commonly affected joints, and predictors of contracture development in burn survivors.  Prospective cohort | N = 985  78.1% M, 21.9% F  mean age at injury: 42.5  mean TBSA 25.1% | n/a | Measurement of AROM of R and L shoulders, elbows, hips, and knees through with a goniometer and inclinometer.  ROM assessments were performed from 1993 to 2002. | 38.7% of subjects developed a contracture. An average of 3 contractures was found in those who formed contractures. The most common joints affected were the shoulder (38%), elbow (34%) and knee (22%). Significant predictors (p < 0.05) included length of stay, severity of burn, and grafting. | Contractures are a significant problem in the burn patient population, and individuals with extensive burns are at high risk for their development. Emphasis should be placed on positioning and PT interventions to prevent contractures in the acute phase of rehabilitation. |
| Okhovation and Zoubine  Burns  2007  A comparison between two burn rehabilitation protocols. | To compare traditional burn rehabilitation (control) with a Burn Rehabilitation Protocol (BRT) to determine their effectiveness.  RCT | N = 30  Control group:  14 M, 1 F  mean age 36  mean TBSA: 33%  BRT group:  14 M, 1 F  mean age: 39  mean TBSA: 28% | Control group: 15-20 minutes of PT, 1x/day, beginning 2 weeks after admission, and 10-15 days after grafting. AROM and PROM.  BRT group:  30-45 minutes of PT, 2-3x/day, beginning 1st day of admission and 3 days after grafting. Chest PT, AROM and PROM based on assessment focusing on areas at risk for contracture, ankle pumps 3x/day, active exercise with e-stim, early ambulation, daily visit with patient’s family for education. | Goniometry and assessment of presence of contracture, thrombosis, length of hospital stay, and grafting.  1x post-intervention assessment performed at discharge from hospital. | Only 6% of BRT subjects developed contractures, while 73% of the control group developing contractures. No significant differences were found in thrombosis or length of stay. | The extreme difference between the groups suggests that a more intensive PT protocol focusing on early intervention, focused ROM activities, exercise and ambulation can help reduce the liklihood of developing contracture. However, the study was limited by the fact that no pre-intervention measures were taken. Causality of these differences between the groups cannot be established due to the lack of pre-intervention subject data. |
| Junker et al  Burns  2008  Mechanical tension stimulates the transdifferentiation of fibroblasts into myofibroblasts in human burn scars. | To investigate the relationship of mechanical loading on myofibroblast formation in scar tissue, and whether the degree of loading correlates to changes in myofibroblast development.  In vitro model | Tissue samples of hypertrophic burn scars were taken from 5 different patients 12 months post injury, with deep partial thickness or full thickness burns. | A scar stretching device providng 0.66 N/cm2 of force on the tissue samples was provided.  Group 1: stretched for 1 day  Group 2: same conditions as group 1 but left unstretched  Group 3: stretched for 6 days  Group 4: same conditions as group 3 but left unstretched | Immunohistochemical assay and staining was performed to determine the number of myofibroblast vs. fibroblasts | A signicicant increase in the number of myofibroblasts was observered in the stretched tissue, both after 1 and 6 days, with 6 days of stretching resulting in the greatest formation of myofibroblasts. | Intensive stretching may lead to the differentiation of fibroblasts into myofibroblasts which can result in hypertrophic scarring. Duration of stretching may have an affect on the formation of scar tissue and further evaluation of parameters should be performed to find the optimal duration and intensity of mechanical loading to apply to scar tissue to prevent contracture without resulting in hypertrophic scarring. |