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Pediatric Burn Management: Examining Efficacy and Affordability

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Pediatric Burn Management: Examining Efficacy and Affordability

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This evidence project, submitted by

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has been approved and accepted
in partial fulfillment of the requirements for the degree of
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Key words: burn, pediatric, cost-effective

Abstract

Our research was led by Kelly Culhane, OTR/L, at California Children Services (CCS), in searching for efficacious and cost-effective occupational therapy treatments, or sequences of treatments, in chronic pediatric (ages 3-21) burn scar management. The primary outcomes following burn scar treatment are to increase functionality, mobility, well-being, and to improve the physical appearance of the scars. Research suggests that exercise, massage, silicon gel, and silicon patches can all be used as occupational therapy treatment for burn scars. Unstructured massages and silicon patches were found to be the most cost-effective solutions, resulting in less itch and scar vascularity, and increased range of motion of the burn scar sites. Additionally, completion of exercise programs were found to lead to fewer surgeries to improve functionality of burn scars.

Because burn scars are infrequently seen by pediatric occupational therapists, a website page was created on burn scarring information and treatment for practitioners who may not have much exposure to burn scar treatment. The impact of the website page was measured by counting visits to the site in its two week launch period; the site acquired a total of 107 views in March and April of 2023, with 71 views in March and 36 views in April. Although treatment recommendations were based upon the most current published research, a limitation to this review was the scant number of studies on burn scar treatments, specifically in the pediatric population. Future studies focused on the pediatric population and how they best respond to various burn scar treatments would be beneficial for enhancing evidenced-based interventions.

Critical Analysis of Topic (CAT)

Focused Question

The topic of our study is finding new and affordable ways to assist burn scars in becoming more functional and improving quality of life.

Which interventions, or sequence of interventions, are both least expensive and most effective in promoting functionality for occupational performance with clients, between the ages of 3 to 21, who require chronic scar management following a burn?

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Date Review Completed

November 1, 2022

Professional Practice Scenario

Our practitioner works in an out-patient pediatric OT clinic in Orange County, California. The U.S. Census (2021) indicates that the racial demographic of this county is predominantly white (69.7%), Hispanic or Latino (34.1%), and Asian (22.8%). This clinic is in a unique position, as it is fully state-funded and some clients may be on Medicaid. Once a patient is referred to the site, they are eligible for care until they 'age out' at 21 years of age. The occupational therapist works primarily with children and adolescents who have neurological or musculoskeletal deficits such as traumatic brain injuries, strokes, muscular dystrophy, cerebral palsy, and diseases of the brain. In addition to her work with neurological deficits, she also does burn and post-op scar treatment and management for clients up to the age of 21.

Our practitioner's location in Orange County and the context of her clinic underscore our practitioner's current need and the reason for our research: she treats clients from low socioeconomic status (SES) and is looking for the most cost-effective intervention ideas possible. According to the 2021 U.S. Census Bureau, much of Orange County is above the poverty line (91%), but our practitioner often works with clients who are below that line. Some interventions for wound care are not reusable, such as silicone gel patches. These patches would need to be purchased and used for up to two years, depending on the severity of the burn. This expense can be taxing for families who are already dealing with financial hardship. Additionally, our practitioner noted an issue specific to pediatric care, in that some home program interventions are difficult with younger children. A young child might dislike silicone gel patches or a pressure garment and remove the physical agent from their bodies, potentially wasting expensive resources. Compression pressure garments are specific to the size of the

client and area of the scar which is complicated by the practitioner’s specific population of children. Because children are developing and increasing their body surface area as they grow, pressure garments last only until the clients grow out of them. This issue led our practitioner to wonder if there is another form of treatment that is supported by research but is less expensive over the course of treatment for a burn scar.

Our practitioner focuses her interventions on fully healed scars rather than wounds and wound care, meaning that she sees a variety of scars. The severity of the scar depends on several factors, including the location of the scar, the type of surgery, and the style of the surgeon. Many of her clients with burn scars have functional deficits such as loss of AROM, pain and risk of joint contractures. There are a variety of treatment options currently available for scar management, including silicone gel or silicone patches, compression pressure garments, scar massage, and vitamin E serums. Depending on the nature of the scars, the type and frequency of treatment will change. Once the scar has been stabilized, treatments can gradually shift from several times a week to twice a year.

Method

Search Strategy:

Categories	Key Search Terms
Patient/Client Population	Pediatrics, youth, under 21, young burn survivors, children, adolescents
Intervention (Assessment)	Treatment, protocol, procedure, therapy, therapeutics, remedy, naturopathic
Comparison	Burn, thermal trauma, heat trauma, degree of burn, scald, scar, scar management, scar treatment, chronic, cost-effective, cheap, affordable, low SES, frugal,
Outcomes	Functionality, aesthetic, ROM, color, strength, ease of use, quality of life, wellbeing, standard of living, comfort, good health, happiness, effective, optimal, efficacious, successful, productive

Databases, Sites, and Sources Searched
Medline
Journal Storage (JSTOR)
American Journal of Occupational Therapy (AJOT)

Canadian Journal of Occupational Therapy (CJOT)
British Journal of Occupational Therapy (BJOT)
Cumulative Index to Nursing and Allied Health Literature (CINAHL)
SPORTDiscuss
PubMed
National Center of Biotechnology Information (NCBI)
Public Library of Science (PLOS)
Google Scholar
Education Resource Information Center (ERIC)
PsychInfo
Journal of Burn Care & Research
OTSeeker
Journal of Hand Therapy
Journal of Rehabilitation Medicine
Journal of the American Medical Association

Procedures for the selection and appraisal of articles

Inclusion Criteria

Articles that target a population of ages 3-21, including all genders; publication date should be from the year 2000 to the present; international journals; studies that examine burns and burn management on all locations on the body. Burn management technique outcomes should emphasize QoL and/or functionality. Other terms that are of interest to our group are ROM, play, and strength. Key inclusion criterion is cost-effective.

Exclusion Criteria

Exclude studies that focus on infants (3 years of age and below) and adults (21 years of age and above). Exclude any type of wound care or acute burn stages. Therefore, in-patient hospital settings and acute care settings do not match the interests of our practitioner and will therefore be excluded from our search criteria. Studies published before 2000 will be excluded so as to narrow our search and because there may exist more current interventions.

Search Outcomes/Quality Control/Review Process

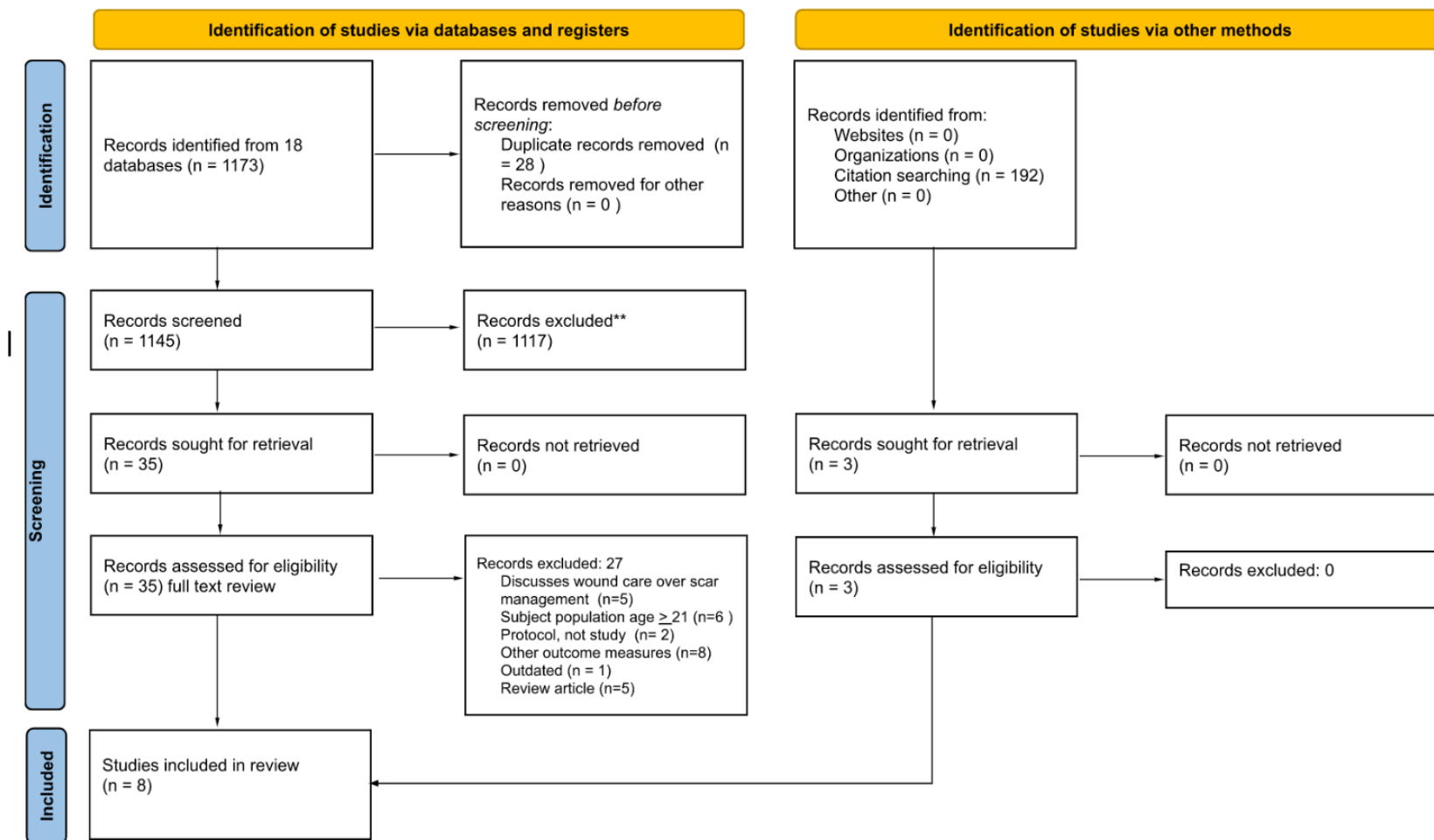
The search engines were equally divided between the four of us. Different combinations of our key words, inclusion and exclusion criteria were entered into the databases to maximize saturation of results. We tracked our searches using the search tracking table and entered the number of results as well as excluded, kept and duplicate articles found from each search. Each article was screened first by title, then by abstract. If articles seemed relevant to our question after reading the abstract they were entered in our master citation table (MCT) (see Appendix D) and labeled by who found the article.

When the initial database screening was complete, we cross checked the articles in the MCT by dividing them and assigning each member different articles than the ones they found to determine whether to include, exclude or maybe include. The reason for exclusions were entered into the MCT. By this process our articles in the MCT had one member who performed a full text review. Next, we divided up our “maybes” to assign another full text review cross check to a member who had not read the article yet to determine inclusion or exclusion. By this time at least two members had read the “maybes” in a full text review allowing them to discuss their reasons for inclusion or exclusion with the group. When two members could not come to an agreement on an article, a third member would step in to determine if the relevant article should be included or eliminated.

When entering our articles into the CAT tables, each member reviewed at least one article that they had not conducted a full text review on yet. Some members experienced roadblocks while entering studies into the CAT by ending up excluding review articles upon further inquiry by faculty. After consulting this faculty about the next steps to locate more findings, the members were tasked with going through the references in those articles to search for other possible articles. If they found one to include, it was entered into the MCT, reviewed by another member, then entered in the CAT table. We then contacted another faculty to inquire about more databases to search in as we wanted to establish a fully saturated database search. Any articles found went through the same inclusion/exclusion process as those found in the review articles.

Graphic Representation of the Research Process

Adapted PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and other sources



*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).

**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71. For more information, visit: <http://www.prisma-statement.org/>

Adapted by University of Puget Sound School of Occupational Therapy

Results

Literature Searching and Article Inclusion

Initial searching encompassed a total of 15 different databases. Using various combinations of chosen search terms, a total of 1,173 articles were found from the databases (see appendix C). Once at the point of saturation from the databases, the researchers reviewed the articles. Of these 1,173 articles, 28 of them were removed as duplicates, leading to 1,145 that were screened by title and abstract. This led to the exclusion of 1,117 articles. The remaining 35 articles were added to the Master Citation Table and given a full text review. Articles that researchers were confident in were entered into the CAT table by a different researcher than the one who originally found the article. All articles that the researchers were unsure about underwent a rigorous cross-check process between multiple researchers to determine whether the article fit the predetermined inclusion and exclusion criteria. This full text review led to 27 articles being excluded, leaving a total of 8 articles remaining. Main themes for reasons for exclusion include a focus on wound care, subjects being over the age criteria, focusing on outcomes other than scar management, or were a protocol or review article. Upon the realization of a smaller than anticipated final number of articles, researchers picked up an additional 3 databases (final number of databases being 18), as well as citation searching through the 8 remaining articles.

Evidence

Table Summarizing the *QUANTITATIVE* Evidence

<u>Author</u> <u>Year</u> <u>Journal</u> Country	Study Objectives	Study Design/ Level of Evidence/	Participants: Sample Size, Description Inclusion and Exclusion Criteria	Interventions & Outcome Measures	Summary of Results	Study Limitations
Brown, C.A. 2002 <i>Occupational Therapy International</i> Saudi Arabia	Demo effectiveness of SG burn scar tx option & provide tx guidelines that address cultural, clinical & pt compliance issues	D4 AOTA: 4 Case study	N = 1 18 m/o w/ transverse scar fr a scald burn across his R hip Incl: Consent fr parents, placement in hospital Excl: n/a	tx: using SG to treat scar, w/ gradual building of tolerance to wearing 18 hours/day Measures: VBSS	Pt. @ end of treatment had VBSS of 2, demonstrating reduced scar symptoms (previously VBSS score of 9). Use of SG produced better outcomes than potential tx fr BPG	Case study, no photographic evidence, use of only one outcome measure
Celis et al. 2003 <i>American Burn Association</i> USA	Compare tx btx supervised PTEX vs tx w/ home-delivered PT & OT to see if increased exercise would have fewer surgical interventions	E2 AOTA: 1B RCT	N = 53 PTEX n = 27 PT* n = 26 Ages 6-19 y/o Incl: burns >40% TBSA Excl: anoxic brain injury, psychological d/o, quadriplegia, severe behavior, cognitive d/o	tx: PTEX: 12 week (6-9 mo post burn injury) hosp based physical rehab prog, w/ individualized/ structured exer. trng PT*: 12 week home-based physical rehab w/out exer. prog (6 mo post burn injury) Measures: incidence of jt. contracture, musculoskeletal abnormalities, mm strength, aerobic capacity, need for FSR on major body joints	@ 12 mo, statistically significant difference btx tx (p = 0.004), with PREX group having less surgeries than PT* group @18 mo, (p = 0.01), with PREX group having less surgeries @ 24 mo, (p < 0.001), with PREX group having less surgeries	Assumption that less surgery correlates with improvement in completion of ADLs

<p>Silverstein et al. 2011 <i>The Journal of Burn Care & Research</i> USA</p>	<p>Compare direct & indirect cost & healing outcomes; performance; tolerance; safety; & pain of MAg vs. SSD txs</p>	<p>E2 AOTA: 1B RCT</p>	<p>N = 101 MAg n = 29 SSD n = 51 Pts fr 10 centers across mainland USA. Incl: 2nd degree burn area of 2.5-20% TBSA; thermal burn; age ≥ 5 y/o Excl: chemical or electrical burn; infected burn; burns older than 36 hours; diagnosed underlying diseases</p>	<p>tx: MAg: dressing applied to scar, changed every 5-7 days. SSD: burn area cleansed with cream 1-2x daily, covered with gauze and wrapped. SSD removed before reapplication. Measures: Cost (MAg<SSD); Ease of product use (MAg>SSD); Pain (MAg = SSD); rate of healing (MAg<SSD).</p>	<p>Strong indication that MAg is more cost effective, easier to use, & quicker to heal burn scars compared to SSD.</p>	<p>Limited follow up (21 days), non-blinded observation, subsampling.</p>
<p>Valladares-Poveda et al. 2020 <i>Journal of the International Society for Burn Injuries</i> USA</p>	<p>Compare structured & formalized scar massage programs to determine which improved QOL of clients more.</p>	<p>E3 AOTA: 2 Controlled clinical trials (prospective cohort study)</p>	<p>N = 100 tx A n = 57 tx B n = 43 Incl: Age ≤ 15 y/o Pt ≥ 2 burn scar evals Pt w/ 2nd or 3rd degree burns Excl: Pt ≥ 16 y/o Pre-ex skin condition Pt only has superficial burns Pt < 2 burn scar evals Pt has keloid scars</p>	<p>tx A: unstructured (general massage protocol w/out specific technique, no training for therapist in scar massage, no follow up training or home program) tx B: structured (techniques procedures defined & standardized, trained rehab team, formal home program & education provided) Measures: A = B in itch, scar height, vascularity (↓ for both), pliability, itch (↓ for both) & pain</p>	<p>No observable difference btx structured & unstructured massage on QOL for ped burn pts, though massage may ↓ anxiety and fear. Massage may be most effective in conjunction w/ other therapeutic interventions (stretching, orthotics, compression).</p>	<p>Conducted retrospectively so lacking control group → cannot be concluded that massage improved vascularity & itch rather than time.</p>

<p>Wiseman et al. 2020 <i>Clinical Rehabilitation</i> Australia</p>	<p>Report effectiveness of treating burn scars using TSG & PGT independentl y or in combination 6 mos. after burn injury</p>	<p>E2 AOTA: 1B RCT</p>	<p>$N = 86$, after attrition 73 $n1 = 34; n2 = 28 ;n3 = 24$ Incl: Age ≤ 16 y/o Sustained acute burn injury $\leq 40\%$ TBSA Reconstruction surgery for pre-ex burn scar Excl: Referred to health services before scar mgmt began, Comorbidities influencing outcomes dermatological or neurological</p>	<p>tx groups: 1: TSG 2: PGT 3: TSG + PGT Outcome measures: Scar color, scar severity, itch, QOL, adherence, intervention burden, tx satisfaction, interface pressure</p>	<p>No difference btx any of the tx groups; TSG = PGT = TSG + PGT.</p>	<p>Only up to 16 y/o Study lasted 6 mos. which is not long for scar healing</p>
<p>Wiseman et al. 2021 <i>Clinical Rehabilitation</i> Australia</p>	<p>Report results of long-term effectiveness of TSG & PGT for managing ped postburn scarring</p>	<p>E2 AOTA: 1B RCT</p>	<p>$N = 86$ after attrition 73 $n1 = 34; n2 = 28 ;n3 = 24$ Incl: Age ≤ 16 y/o Sustained acute burn injury $\leq 40\%$ TBSA Caregiver present for informed consent Excl: Referred to health services before scar mgmt began; comorbidities influencing outcomes dermatological or neurological); isolated facial, ear, genital burns</p>	<p>tx groups: 1: TSG 2: PGT 3: TSG + PGT Outcome measures: Scar color, scar severity, itch, QOL, adherence, intervention burden, tx satisfaction, interface pressure</p>	<p>No difference btx any of the intervention groups; TSG = PGT = TSG + PGT.</p>	<p>Rates of adherence were worse for the combined intervention; results may not generalize to people with Fitzpatrick Skin Type VI</p>
<p>Neugebauer et al. 2008</p>	<p>Determine if 12-week rehab program with music &</p>	<p>D3 AOTA: 3B Survey</p>	<p>$N= 24$ GMEP $n=15$ SOC $n=9$ All participants came fr</p>	<p>GMEP: OT or PT provided tx at hospital 60min 3d/wk for 12 weeks SOC: OT & PT tx daily</p>	<p>GMEP significantly improved ROM in all joints except PROM to L elbow</p>	<p>Small sample size (<30) Not randomized or controlled for ROM measurements</p>

<p><i>Journal of Burn Care & Research</i></p> <p>USA</p>	<p>exercise improves fxal outcomes more than SOC in children with severe burns</p>		<p>facility</p> <p>Incl: medically ready per attending phys., Age=2-6 y/o, ≥ 40% TBSA, recently discharged fr ICU</p> <p>Excl: amputation to legs, Hx developmental delay before hospitalization, Hx neurological injury, previous significant hearing or vision loss</p>	<p>until discharge</p> <p>Outcome measures: AROM & PROM in bilateral elbows and knees within tx groups & btx tx groups pre & post tx</p>	<p>SOC no significant improvements except PROM to R knee</p> <p>Btx groups PROM: no significant differences</p> <p>Btx groups AROM: significant differences in L elbow and R knee joints</p>	<p>SOC: not homogenous, or well defined, unknown if caregivers were consistent with rehab program</p>
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Table Summarizing the *QUALITATIVE* Evidence

Author, Year, Journal Abbrev, Country	Study Objectives	Study Design, Level of Evidence (AOTA, Res Pyr)	Participants: Number and Selection, Description, Inclusion & Exclusion Criteria	Methods for Enhancing Rigor	Themes and Conclusions	Study Limitations
Andrews et al. 2017. <i>Burns Open.</i> United Kingdom.	Fill gap in research for factors that influence adherence in ped burn scar mgmt	Q2 AOTA: N/A Phenomenology	N = 25 Recruited fr 3 UK burn services Incl: caregivers/parents of ped burn pts aged 0-9 w/ min 6 mos. PGT Excl: finished PGT 2+ years prior to data collection	Interview data analyzed w/ inductive thematic approach	Themes: developing a routine & emotional division of labor influence tx adherence	Small N, non-diverse N (volunteering to be interviewed may be more likely to adhere)

Table of Abbreviations

Abbreviation	Non-abbreviation	Abbreviation	Non-abbreviation
↓	decrease	mos.	months
@	at	NPWT	Negative Pressure Wound Therapy
&	and	ped	pediatric
AROM	Active range of motion	PGT	Pressure garment therapy
BPG	Body pressure garment	phys	Physician
btw	between	Pre-ex	Pre-existing
demo	demonstrate	pt(s)	patient(s)
d/o	disorder	prog	program
Excl	exclusion	PT*	Physical therapy and Occupational Therapy care **specific to Celis et al.,
exer	exercise	PTEX	hospital-based exercise program with OT and PT
fr	from	PROM	Passive range of motion
FSR	Functional surgical release	QOL	Quality of life
fxal	functional	R	right
GMEP	Group music exercise program	Rehab	Rehabilitation
hx	history	SG	Silicone gel
hosp	hospital	SOC	Standard of care
Incl	Inclusion	SSD	Silver sulfadiazine cream
L	left	TBSA	Total body surface area
MAG	Mepilex Ag (silicone foam)	trng	training
max	Maximum	TSG	Topical silicone gel
Med	Median	tx	treatment
mgmt	management	USA	United States of America
min	minimum	VBSS	Vancouver Burn Scar Scale
mm	muscular	w/	with
m/o	Months old	y/o	Years old

Summary of Key Findings

Topical application (5)

Some research indicated that silicone gel as a treatment for burn scars produced better outcomes than body pressure garments (Brown et. al, 2002) and silver sulfadiazine cream (Silverstein et. al, 2011). More recent research suggested that there is no difference in effectiveness between topical silicone gel and pressure garment therapy (PGT) individually nor combined, both in the short term (Wiseman et. al, 2020) and in the long term (Wiseman et. al, 2021). One qualitative study identified themes of routine and division of emotional labor to be helpful in adherence of PGT (Andrews et al., 2017).

Massage (1)

Other interventions included massage, and Valladares-Poveda et. al indicated that massage is an effective treatment, regardless of technique or training (2020).

Exercise programs (2)

Another intervention found in the literature was exercise with one study suggesting that structured exercise training is more effective than physical rehabilitation without an exercise program (Celis et. al, 2003). This was supported by another study suggesting that group music exercise programs can improve range of motion in children with severe burn scars (Neugebauer et. al, 2008). In this study, dance did not result in statistically significant change in PROM but showed statistically significant change in AROM of many joints, therefore implying that active exercises can benefit ROM while passive stretching may not result in improvement of ROM.

Strength of Evidence

Strong evidence

There is strong evidence ($p \leq 0.001$) to suggest that general unstructured massage protocols result in less itch and scar vascularity, (Valladares-Poveda et. al, 2020), that the exercise group resulted in less surgeries than the non-exercise group (Celis et. al, 2003), and that Mepilex Ag (MAG) is less expensive than Silver sulfadiazine cream (SSD) (Silverstein et. al, 2011).

Moderate evidence

There is moderate evidence ($0.01 < p < 0.05$) to suggest that general structured massage protocols result in less itch and scar vascularity (Valladares-Poveda et. al, 2020), and that MAG is easier to use than SSD (Silverstein et. al, 2011) and that the dance program is just as effective as a standard care program in changing PROM in various joints (Neugebauer et. al, 2008).

Weak evidence

There is weak evidence ($p > 0.05$) to suggest that both structured and unstructured massage protocols result in decreased experience of pain (Valladares-Poveda et. al, 2020), that there was a difference in Topical silicone gel (TSG) and pressure garment therapy (PGT) in scar thickness (Wiseman et al, 2020; Wiseman et. al, 2021), that increasing routine and dividing labor more evenly results in higher adherence (Andrews et. al, 2017), and that SG resulted in fewer scar symptoms compared to body pressure garment (BPG) (Brown et. al, 2002).

Implications for Practice**Implications for Consumers**

The out of pocket expense for consumers has the potential to accrue with time, leading to financial strain for families if they are required to cover the cost of the materials. Children may have difficulty keeping gel patches on due to play and general discomfort with topical treatment. Parent's play a large role in their child's adherence to a given treatment plan, and their emotions and values need to be considered in regards to the type of treatment given. Parents may experience emotional distress from enforcing a temporarily uncomfortable home program treatment plan that causes distress to their child or see topical coverings with negative connotations.

Implications for Practitioners

Interventions typically involve training the client on use of the intervention, and then having clients perform them at home. Some interventions may require special training for therapists to administer. Practitioners also need to consider their budget and what interventions they or their clients can afford by implementing combined interventions of physical agents and activities. Exercise programs along with silicone gel seem to show improvements in scar appearance and function, though not as cost-effective as massage and exercise programs given during OT sessions. Using a holistic approach practitioners should consider multiple factors in their creation of a treatment plan such as location of the scar, the age of the client, and what the family would consider a financial strain. Implementing an exercise program in addition to other OT treatments has the potential to prove as a cost-effective supplementation to help with treatment outcomes for scar treatment, though may not be as effective if implemented on its own.

Implications for Researchers

The research surrounding managing chronic burn scars is very limited in pediatric care and most existing research is in adult populations. Additional areas of future research could potentially include qualitative research on the impact of caregiver burden and financial concerns in relation to pediatric scar management as well as determining if there is any noticeable distinction between the efficacy of gel and silicone patches on scar

management. It would also be beneficial to examine best methods for practitioners to support parents of young children with chronic scars.

Bottom Line for Occupational Therapy Practice/ Recommendations for Best Practice

Overall, topical silicone gel, pressure garment therapy, exercise and massage are all viable and evidence-based practices that improve burn scarring. An occupational therapist's role in treating chronic burn scarring for pediatric clients is greater than treating just the scar. Additional factors that influence adherence to a treatment plan include the parent's perspective on how the treatment will impact their child's social, emotional, and physical wellbeing. There is promising evidence to suggest that combining traditional scar treatments with exercise can help improve outcomes such as ROM.

Involvement Plan

Needs Assessment

Based on our first meeting with our collaborator, we knew that silicone patches and pressure garments were her primary interventions used to treat burn scars. We also knew that these interventions, when isolated, can be expensive. An aspect of what makes silicone patches expensive is that pediatric clients may rip them off, which eliminates their effectiveness; meanwhile, pressure garments are not as efficient as their potential allows because children may grow out of them. Because our collaborator's clients have low incomes, and because the clients are also responsible for their treatment after the initial visit with the therapist, it was important to determine the most effective, low-cost interventions for burn scars so that they might adhere to their intervention plan and demonstrate the best outcomes possible. After investigating this question and coming up with some solutions, we determined that there was great need for both our collaborator as well as her clients to access the information that we found. This led us into our plan for knowledge translation.

We had three main goals associated with this project. Our primary goal was for our collaborator to have access to information regarding which burn scar interventions are most effective and low-cost. Our second goal was for this information to reach our collaborator's

clients, such that their adherence to our collaborator's intervention plan may increase. By increasing adherence, our third and final goal was to improve the overall wellbeing and quality of life for our collaborator's burn scar clients.

In order to bridge the gap between the needs of our collaborator and achieving the goals we set out, there were several action steps we planned to take. The first was to effectively communicate with our collaborator what we found. We shared our CAT table with her so that she could see the general information of the articles that we found that support burn interventions, and we sent her the DOI links to all of the articles. Next, we came up with a plan that included a series of steps; the original plan was not followed, but we detail it here nonetheless to illustrate our process. We planned to create a pamphlet summarizing our findings in an accessible way, intended for our collaborator. In this pamphlet, we would have included pieces of our CAT table and strength of evidence for each intervention option. We also planned to create a decision tree for our collaborator to go through, asking screening questions about her client that may lead her to choose one intervention over another. Our next step would have been to translate this knowledge to our collaborator's clients; this would have taken place in the form of a printable version of the information presented on the "Burns" website page to educate and thus empower clients to make their own choices about treatment. Our overarching knowledge translation project plan was to create an appealing and factually correct website page for the California Children Service (CCS) group focusing on the treatment of burn scars. The documents we were to make would be uploaded to the CCS website. By having this information on the CCS website, research surrounding evidence-based practice and burn treatment would have been more accessible to other practitioners and the general public. Therefore, we aspired to bring awareness

of the topic to the public by helping our collaborator build a website to be publicized in the spring on general burn scar treatment paths.

Knowledge Translation Activities

What was ultimately decided upon for our next course of action included some, but not all, of our proposed solutions for knowledge translation. In creating content for the “Burns” website page, we informed practitioners and the general public alike with evidence based guides to inform and implement interventions about burns and burn scarring. The page provided information to both practitioners and clients in an all-encompassing understanding of burns including healing time, types of burns, types of burn scar symptoms, different layers of skin affected by types of burns, and common interventions. Part of the website was dedicated to summarizing the specific interventions found in our research articles to provide practitioners with a sense of reliability when implementing the interventions they find through the site. By collaborating with Kelly to assemble this webpage, we met our goals as a research team to bring awareness of burns and burn scar management to the public and practitioners.

Context

Our collaborator highly values evidence-based practice. Because our research already correlated to what is currently being practiced in our collaborator’s clinic, we did not anticipate significant organizational barriers to our knowledge translation project. It was important that care was taken in our knowledge translation project to highlight specific pieces of research that have strong evidence to help instill confidence in the forms of treatment that our collaborator uses. Our recommendations for treatment of scars promote current best practices that are backed by research, and including examples of combinations of treatment from the research helped illustrate our project ideas.

Since our collaborator is chair of the CCS group, this expanded the environmental context in which our findings were distributed. To meet their own goals, the CCS offers a journal club on a rotating basis and hosts webinars, as well as providing fact sheets and information about a variety of pediatric diagnoses on their website. The website, which was previously under construction, now breaks down clinical information by topic or diagnosis. Our knowledge translation project aimed to help the CCS offer current and relevant information on the topic of burn scar treatment to the multitude of practitioners and clients that rely on the CCS as a resource to ensure evidence-based clinical practice. Many practitioners who use the CCS website are using the materials to improve their ability to use evidence-based practice in their field, indicating that they were willing to learn and modify what they are currently doing in their practice.

Knowledge Translation Effort

As previously stated, our two initial plans for our knowledge translation projects included compiling information to be placed on the “Burns” page of the CCS website, as well as to explore the impact of the page on practitioners through a questionnaire survey. Finding ways to keep treatment affordable can relieve caretaker burden, which was another objective important to this research. We wanted the information we were providing to be easy to read and follow for practitioners and clients alike. Having a well organized website page would ideally increase reader legibility and allow for better translation from paper to practice.

Therefore, the main focus of our knowledge translation effort was placed into the consolidation of evidenced-backed information relating to interventions surrounding burn scar treatment and potential interventions. Our collaborator indicated that her ideal goal for our part of the website would be to create a page that would act as a resource for practitioners to gain

knowledge of evidenced-based treatment plans and increase practitioner confidence in burn scar interventions. Knowing that our audience would be practitioners who have an educational background in some form of rehabilitation services, we did not need to significantly modify the language from the research to fit a layperson's level of comprehension. We also made sure to use APA citations for information included on the website page, so that practitioners can easily trace and find the complete article to read for greater understanding and knowledge.

Our collaborator highlighted twelve different intervention areas for burn scars that she wanted us to expand upon. These interventions included compression, contracture management, desensitization, edema management, itching, orthoses, pain management, positioning, psychosocial needs, reintegration considerations, scar management, and stretching (see Appendix A). To complete the work in a timely fashion, these interventions were divided up equally between members of the research group and each researcher was responsible for completing the write-up of three different topic areas. Following our write-ups, our work was sent to our collaborator for approval before being uploaded to the website. Our collaborator then shared the website information with her CCS group via an email blast (See Appendix B).

As the final results of our Final CAT included only eight empirical papers, we received permission from our collaborator to use additional peer-reviewed resources to compile information on each intervention area. The current literature is limited in the number of peer reviewed articles addressing pediatric burn scar treatment. However, we were able to find other current peer-reviewed literature to supplement interventions areas that our Final CAT did not grant significant or extensive information on, such as edema management, orthoses, or pain management. These additional resources were found using the PubMed, Google Scholar, NIH and NCBI databases. Examples of key search terms used for included burn scar, stretching,

compression, pressure garments, contracture management, scar management, desensitization, pediatrics, occupational therapy, therapy, functionality, chronic, and protocol. Inclusion criteria for articles chosen were slightly altered from our previous CAT table research, including young adult and adult populations, but still limiting research from before 2000. For the additional articles found, we excluded research articles that had study participants over 60 years of age.

Furthermore, due to the nature of interventions and burn scars, some overlap was found to exist between interventions, such as between reintegration considerations and psychosocial needs. Repetition was avoided on the website by making a note in each relevant section with a statement noting the relationship between interventions and which section had further information. When relevant to the intervention topic, supplementary resources were also included, such as links to the Phoenix Society for Burn Survivors webpage. While not part of peer-backed research, resources such as the Phoenix Society are important to highlight in our knowledge translation project as they serve as an additional resource for social support, advocacy opportunities, and additional information for families. Furthermore, by linking these resources on the website, it provides an opportunity for practitioners to share information with future families and clients.

Workflow

Date	Activity	Details
April 27, 2022	We find out who our collaborator is and what our general topic is	Kelly Culhane OTR/L from Orange County, CA. We learn that our topic is about burn scarring.
May 5, 2022	First meeting with Kelly	We interview Kelly for the first time to get information to shape our PICO and learn about her practice setting.
May 17, 2022	Project Group Work Plan	We set up guidelines for “how to stay friends” throughout the research project, setting up expectations for work, communication, and organization.

May 19, 2022	CAT proposal presentation	
June 9, 2022	Course Mentor (Kirsten) approves our PICO and search strategy plan.	Expanded our search terms to include scar tissue, resumption of ADL/IADL, budget-friendly, within budget, and application. We expanded our international databases to include the Scandinavian Journal of Occupational Therapy and the Australian Journal of Occupational Therapy.
June 15, 2022	Group meeting.	Check in with each other and assess our concerns with the literature search, including search terms used and inclusion/exclusion criteria. Each research member was assigned specific journals to review. A group Zotero folder was set up for each shared access to selected articles.
July 6, 2022	Begin searching for articles in the literature to answer our PICO.	Databases vetted at this point: MedLine, AJOT, PubMed, CJOT, CINAHL, ERIC, PsycInfo, OTSeeker, NCBI, Sport Discus.
July 22, 2022	Continue searching for articles in the literature to answer our PICO.	Continue searching: Journal of Burn Care & Research, JSTOR, BJOT, PLoS, JRM, JAMA
August 4, 2022	Search Tracking Table and Master Citation Table due	First drafts of the Search Tracking Table and Master Citation Table submitted for review and feedback to Kirsten.
September 23, 2022	We reach out to Kelly about whether she has any more ideas about databases to use. We also reach out to Shelly Norvell for additional databases(OTR/L).	Kelly has no additional recommendations that we haven't already checked. Shelly recommends the Journal of Hand Therapy.
September 25, 2022	Cross checks happen between articles to make sure all articles in our CAT are applicable to our PICO. Continue searching for articles in the literature to answer our PICO because we have very few articles.	The Journal of Hand Therapy is reviewed for additional articles.
September 29, 2022	Finalize our CAT table.	
November 15, 2022	Begin working on the Involvement Plan.	Start considering how we will translate the knowledge we acquired through the development of our CAT table.
November 29, 2022	Meeting with Kelly.	We share our CAT with Kelly and she is ecstatic about our results as they reflect her current practice with burn scar clients.

December 6, 2022	Continue working on the Involvement Plan.	Consider making a pamphlet to translate knowledge. Flowcharts for both practitioners and clients as they decide which treatments to use for burn scars and the cost-effectiveness of each option.
December 12, 2022	Meeting with Kelly.	We ask about ideas for action steps; we tell her about the pamphlet and flowchart ideas. She tells us about their website, CCS, and how we can help her build it for our project in addition to making pamphlets.
December 14, 2022	Involvement plan draft is finished.	We submit our plan for building the website with Kelly, as well as the needs assessment we conducted on her setting.
January 25, 2023	Involvement plan revisions are due.	We revise our plan to exclude the pamphlet idea and focus solely on building the website.
February 24, 2023	Meeting with Kelly.	She tells us about specific gaps in the website that she would like us to fill and we set up a plan to fill the gaps in literature by March 20th.
March 20, 2023	Submit website materials to Kelly	
March 24, 2023	Meeting with Kelly.	Kelly approves of submitted information and agrees to upload to the CCS website.
March 31, 2023	Our materials are distributed across the website for the general public.	The intended audience is other OT practitioners but the website is accessible to anyone. We have two weeks to collect data on website hits.

Outcomes Monitoring

Due to the nature of our knowledge translation project and the geographical location of our collaborator, we were not able to see the results of our efforts in person. Since our review of the literature confirmed to our collaborator that she was currently following evidence-based practice, the success of our knowledge translation project was largely determined by the effectiveness of our educational resources provided on the CCS website. To do this, we originally planned to track the views on the “Burns” page of the CCS website over a one month period to identify if practitioners and clients are able to easily find it, if it is being recommended to others, and if it is overall providing helpful knowledge on the topic of burns and burn scar

care. Because of existing time restraints, we decided to monitor the website views over a two week period. Instead of submitting a questionnaire to her associates, our collaborator offered to send out an email announcing the release of the “Burns” page content to the CCS group as she felt we would not receive an adequate number of responses to the survey that would benefit our research. Our collaborator provided the website views breakdown from the two weeks after sending out the email announcing the “Burns” page release.

In addition to the website, we monitored the outcomes of our knowledge translation project with our collaborator by asking her to report back on several of our goals as they relate to her personal work as a therapist. We were interested to see if she changed her treatment of clients with scars or has seen any improvement in her client’s functionality and quality of life, subjective to both herself, her clients, and their caretakers following our research articles. In order to monitor this, we created a questionnaire for her to fill out.

Although having the best product possible at the beginning is preferred, it is understood that there is always room for improvement, and constructive feedback can be incorporated into updated versions of the information products. With feedback from our chair and collaborator, we hoped to create a comprehensive and concise resource page to aid access to evidence-based practice for treating burn scars.

Evaluation of Outcomes

Our plan did come to fruition; we were able to track the views for the website over a two week period and received feedback via survey from our collaborator on her perception of our effectiveness in making change over the year-long collaboration. In sum, we achieved 107 views within two weeks, yielding an average of seven views per day. The results of the survey indicate that our work will be beneficial to OT clinicians nationally as well as families. See Appendix E

for the survey given. Per the survey, the only area in which our collaborator agreed, rather than strongly agreed, is that the information we collected and translated reached clients so that their adherence to an intervention plan will increase. This was not a disappointment to us because the website information was originally sent out to practitioners, not clients. By better informing practitioners, clients will ideally receive more specialized care which may help improve treatment adherence. Overall, according to our collaborator, we moved her project forward and progressed the field towards the most current, affordable and effective burn scar treatments.

Finally, there are several reflections we have regarding what we learned throughout the process of evaluating outcomes. First and foremost, we achieved 107 views on the website within two weeks— but what exactly does that mean? We are not sure what an average number of views for a page release is, therefore we learned that it's important to have a baseline to compare and give the final number of views meaning. Another takeaway is that we hoped our research would follow a specific timeline; it did not. Part of collaboration is being flexible, and that meant that our timeline needed to be flexible as well. In a similar vein, communication was vital throughout the entire collaboration. There were countless examples of circumstances out of our control that required flexibility throughout the past year. In coordinating busy schedules, attempting to align research values, and handling unforeseen life circumstances, communication is what made the process feasible. Ultimately, we found that communication led to understanding and compromise. For example, our data would have been stronger if we could have surveyed the visitors of the website instead of solely our collaborator. However, our collaborator was in possession of knowledge that we did not have: many practitioners that visited the website per her email were bombarded with surveys. We agreed to compromise by tracking views and giving her a survey instead. Our research experience of making compromises to meet our collaborator's

needs is an illustration of the tension faced when considering ideal research conditions and what can be realistically accomplished.

Recommendations

Following our completed review of the existing literature, we have found that there have been minimal studies conducted on burn scarring occupational therapy treatments and interventions in the pediatric population since the year 2000. Many of the pediatric cases are over 20 years old, making it difficult to provide accurate and up-to-date information on the topic. There have, however, been many recent studies on burn scars within the adult population and studies demonstrating the longitudinal impact of burn scars on overall daily function. Although children and adolescents typically have similar dermal healing phases and patterns as adults do until reaching middle aged, there are many different habits and routines among the pediatric population which can affect the healing process that are unique to pediatric clients.

Additionally, a majority of the studies that were found do not address occupational therapy services or how they can be beneficial in the scar healing process. Rather, surgery and physical therapy have more data available. Treating burn scars does fall within occupational therapy's scope of practice, as the nature of treating burn scars includes physical and psychosocial factors. Burn scars also may impact an individual's ability to participate in meaningful occupations, such as dressing or social participation.

Finally, several treatments and interventions to treat burn scars can be relatively expensive, and can prove difficult for parents to supply the necessary materials for their child for the entire recovery process. It is important occupational therapy practitioners keep in mind the cost of recommended treatments and home programs, and that more cost effective solutions be determined. Additionally, due to the variation of both severity and location of injury, it is critical

to understand that cost effective solutions may prove to require different interventions following each individual's treatment needs. Pediatric occupational therapists would further be able to holistically address a pediatric burn scars client's needs if additional studies were conducted on the most cost-effective and functionally effective interventions for burn scars treatment.

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Appendix A: Burns Website Information

1. Compression
 - a. Pressure garments
 - i. Used to control scar maturation (Proctor, 2020)
 1. Reduce scar thickness, redness, swelling, itching
 2. Protect newly healed skin/graft
 3. Prevent contractures by maintaining contours
 - ii. Provided by member of the burn team per physicians order soon after wounds are fully closed (Proctor, 2020)
 - iii. Usually preceded by elastic garment that applies 10-15 mmHg pressure to prepare (Van den Kerckhove et al., 2005)
 - iv. Pressure needs to be higher than 24 mmhg to overcome capillary pressure and reduce erythema (Van den Kerckhove et al., 2005)
 - v. Garments with higher compression lose pressure more quickly (Van den Kerckhove et al., 2005)
 - vi. Can be used in conjunction with silicone gel but it will not decrease scar maturation timeframe (Wiseman et al., 2021)
 - vii. Pressure garments can add to the itching and pain which can decrease client compliance (Jones, 2017)
 2. Contracture management
 - a. Thermal burns most often cause contracture (Puri et al. 2013)
 - b. Consistent use of orthotics, massage, stretching, and exercise regime to prevent post-burn contracture (Proctor, 2020)
 - c. Orthotic use
 - i. Early use of splints to prevent development of post-burn contracture in the acute stage is essential (Proctor, 2020)
 - ii. Customized serial static splint can be used to decrease the need for surgical intervention (Puri et al. 2013)
 - iii. See more on Orthoses
 - d. Scar massage
 - i. Hypertrophic scars have a high rate of contraction (Proctor, 2020)

- ii. Effleurage (circular stroking movements), petrissage (kneading movements), and friction (rubbing strokes) massage using moisturizing cream or oil for each area (Cho et al., 2014)
 - iii. Avoid heavy perfumed lotions and oils (Proctor, 2020)
 - iv. Protocols vary and yield similar results improving scar characteristics (Valladares-Poveda, 2020)
 - e. Mobilization
 - i. Should be moved and stretched several times a day (Proctor, 2020)
 - ii. See more on Stretching
 - f. Silicone gel aids in vascularity to hypertrophic scars (Téot, 2020)
 - g. Soft silicone foam dressing used to treat partial thickness burns is more cost effective than silver sulfadiazine cream (Silverstein, 2011)
3. Desensitization
- a. Impairment and changes in sensation is common in burn scars (Proctor, 2020)
 - b. Touch and deep pressure (massage) helps with desensitization of hyper-sensitive scars (Proctor, 2020)
 - c. Light stroking and acupressure for 30 minutes a week for 3 months decreased pruritus and depression symptoms (Cho et al., 2014)
 - d. Cooling agents and TENS can be used to decrease pain and pruritic sensation (Téot, 2020)
4. Edema management
- a. Elevation positioning (at least 2 pillows) (Laxton, 2020)
 - b. Compression:
 - i. The extremity should be bandaged distal to proximal to assist with lymphatic and venous drainage using a spiral or figure eight technique (Villico, 2011).
 - ii. Ace wrap in figure-8 pattern over dressings (Laxton, 2020)
 - iii. Modified hand compression bandage increased grasp power, results on Jebsen hand function test and each proximal interphalangeal joint ROM (Park et al, 2016).

- iv. Types of wraps: spiral application of Coban to fingers, figure of eight to hand and wrist; pinch application of Coban to fingers, spiral application to hand and wrist > generic compression glove in reducing edema and increasing ROM, although all types are effective overall (Edwick et. al, 2020).
 - c. Cold therapy – icing can temporarily reduce edema in superficial burns (Altintas et. al, 2013)
 - d. Electrical stimulation with usual physiotherapy reduces local acute hand burn edema (Edgar et. al, 2011; Chu et. al, 1996).
 - e. Encourage AROM (Laxton, 2020)
 - f. Make sure the way the wound dressings are wrapped isn't worsening edema (Laxton, 2020)
 - g. Once healed or wound is close to being healed, can use Coban wrapping, edema gloves (or Tensoflex or Tubigrip), & massage (Laxton, 2020)
5. Itching
- a. Background:
 - i. Severity of pruritus assessed with numeric rating scale and Itch Man Scale (Nieuwendijk et. al, 2018); visual analogue scales and the itch severity score (Zachariah et. al, 2012)
 - ii. Intensity and frequency are greater within the first 3 months and with a deeper wound or higher TBSA (Nieuwendijk et. al, 2018)
 - iii. Itching is very common in burn patients; some say the incidence is more than 67% (Nieuwendijk et. al, 2018), or anywhere between 80% and 100% (Ahuja et. al, 2011).
 - iv. This symptom is distressing and debilitating– interferes with sleep, ADLs, and may cause additional tissue damage from scratching (Bell & Gabriel, 2009).
 - b. Tx:
 - i. Topical applications: doxepin cream over a burn scar not over 20% SA (Zachariah et. al, 2012)

- ii. Pulse dye laser (Bell et. al, 2009; Nomura et. al, 2003; Parrett & Donelan, 2010); recommended setting at 595 nm with cryogen spray cooling (Brewin & Lister, 2014).
- iii. Random: Oatmeal baths (Zachariah et. al, 2012), massage therapy (Zachariah et. al, 2012); electrical nerve stimulation (Zachariah et. al, 2012); biofeedback therapy (Zachariah et. al, 2012); psychological support (Zachariah et. al, 2012)
- iv. Common meds: gabapentin, antihistamine, corticosteroids, ondansetron, paroxetine, naltrexone (Zachariah et. al, 2012)

6. Orthoses

- a. General indicators of when to use an orthosis: (Barrett, 2017)
 - i. Can't get to an intrinsic plus position actively
 - ii. Circumferential hand burns
 - iii. Anterior elbow burns
 - iv. Under the armpit burns (Yi et. al, 2013)
- b. Reasons for orthosis application:
 - i. Prevent contractures (Yi et. al, 2013; Chen et. al, 2021; Parry et. al, 2019)
 - ii. Maintain or increase joint ROM, protect joint functions (Yi et. al, 2013)
- c. Hand burns: (Barrett, 2017)
 - i. Dorsal hand burns: put hand into intrinsic plus position (MCPs flexed, IPs extended) & thumb abducted (halfway between & palmar abduction) to stretch web space
 - ii. Volar hand burns: resting pan orthosis with full finger extension & full thumb abduction
 - iii. Circumferential hand burns: alternate between intrinsic plus & resting pan orthoses (but modify the resting pan to allow slight MCP flexion for deep hand burns to prevent claw hand positioning); when both sides are involved, we favor treating the extensors slightly because the skin over them is thinner and thus the extensor tendons tend to be more involved

- d. Consider using ace wrap instead of straps on splints to increase surface area and thus reduce pressure points (Barrett, 2017)
 - e. Consider alternating between static and dynamic orthoses to maintain tissue tension while enhancing joint mobility and muscle strength (Yi et. al, 2013)
7. Pain Management
- a. Background
 - i. Pain accompanying burn scars (Abd-Elseyed et al., 2022)
 - 1. Pain remains present in 25-68% of burn patients
 - 2. Associated with lower quality of life
 - 3. Stress and depression can increase pain in burn scars
 - b. Medication (Abd-Elseyed et al., 2022)
 - i. Systemic medications
 - 1. Antidepressants
 - 2. Sodium-channel modulators
 - 3. Gabapentinoids
 - ii. Topical treatments
 - 1. Local anesthetics
 - 2. Lidocaine patches
 - 3. Capsaicin cream
 - 4. Menthol
 - c. Massage therapy (Abd-Elseyed et al., 2022)
 - 1. Structured and unstructured
 - 2. Should be advised by a clinician to avoid further damage to the scar
 - d. Active Motion-Based Therapy (Abd-Elseyed et al., 2022)
 - 1. Exercises used to increase range of motion, strength, and flexibility
8. Positioning
- a. Elevation of the head and chest (Procter, 2010)
 - i. Reduces swelling of of the head, neck, upper airway
 - ii. Helps with chest clearance
 - b. Elevation of all affected limbs (Procter, 2010)

- i. Edema can be present in the peripheries during the early stages of burn care
 - c. Splinting (Procter, 2010)
 - i. Hands should be splinted to avoid contractures
 - ii. Feet should be kept at 90 degrees to avoid pressure on the heels
 - iii. Continued use helps stretch scar tissue as it forms
 - iv. Should be accompanied by an active exercise and stretching regime
 - d. Legs (Procter, 2010)
 - i. Should be kept in a neutral position as much as possible to avoid external rotation of the hips
 - e. Anti-contracture positioning (Procter, 2010)
 - i. Positioning in the opposite direction of the burn site can help in avoiding contracture formation
- 9. Psychosocial needs
 - a. High prevalence of Axis 1 psychiatric diagnoses in young adults who were burned as a child, with anxiety disorders having the highest prevalence (Baker et al., 2007)
 - i. Prevalence of current and lifetime psychiatric diagnosis is twice the national average
 - ii. Recognize the potential impact of anxiety on QoL and occupational deprivation.
 - b. Other possible diagnosis include posttraumatic stress disorder (PTSD), depression, and anxiety (Téot et al., 2020)
 - i. Highest likelihood of diagnosis close to burn event, majority of individuals will recover and only a minority will have long-term problems
 - ii. Clinical screening for PTSD, depression, and anxiety should be considered.
 - c. Be aware that aesthetic differences of the skin (color, texture, size of scar) can cause negative self-perceptions and increase risk of developing mental health complications (Téot et al., 2020)

- i. Decreased self-esteem and body-esteem, individual may require help adjusting to body changes
 - ii. Potential feelings of stigmatization, face prejudices, discrimination, or intrusive behaviors from others which may lead to anxiety, depression, or avoidant behavior
- d. Objective severity of scarring is not a good predictor of an individual's psychological adjustment. The individual's subjective perception is the best indicator (Téot et al., 2020)
 - i. Poor mental health (such as depression), can alter how a scar is perceived, may lead to difference in scoring between client and practitioner
- e. Other factors include
 - i. Facial scarring (Téot et al., 2020)
 - 1. Facial scarring can be devastating to one's sense of identity and ability to confidently engage in social interactions
 - 2. Facial scars are more likely to be more distressing and are more likely to face specific social challenges- staring, intrusive questions
 - 3. May be perceived as angrier or sadder
 - ii. Concealed scars (Téot et al., 2020)
 - 1. Anxiety of when to show scars, how to present in public areas (such as the beach or swimming pool)
 - 2. May lead to occupational deprivation due to avoiding potential social hardship
 - iii. Pain (Procter, 2010)
 - 1. May influence adherence to home programs, refusal to participate in treatment
 - iv. The client has the potential to develop feelings of guilt in regards to traumatic event and this may lead to withdrawal (Procter, 2010).
 - v. Family support is crucial, especially with a younger client. Parents or caregivers might possibly benefit from mental health services as well (Ohgi & Gu, 2013)
- f. OT Role

- i. Be prepared to refer to a psychologist to fully meet psychosocial needs
 - 1. May benefit from cognitive-behavioral therapy (CBT) (Téot et al., 2020)
 - ii. Pay attention to indications of underlying psychosocial symptoms and how each patient is reacting to their scar(s)
 - iii. Listen to concerns, be empathetic and compassionate, and answer all questions to help alleviate fears surrounding recovery process and treatment (Procter, 2010).
- g. Interventions
- i. Social skills training to help prepare for variety of reactions from others (Téot et al., 2020)
 - ii. Peer support groups (Téot et al., 2020)
10. Return to School/Work/Community Reintegration
- a. Important parts of the rehabilitation process should be introduced as early as possible into the care routine, to promote adherence and prevent poor outcomes in the future (Procter, 2010).
 - b. Individuals should be encouraged to return to normal daily routines as soon as possible and return to previous life roles as much as they can (Procter, 2010)
 - i. Including school, work, and hobbies as they are able to participate
 - c. Developing a routine for continued scar treatment that works with the daily routine will help promote adherence (Andrews et al., 2017).
 - i. Consider connecting a specific treatment intervention with a specific time of day, such as coming home from school, around bathtime, or as part of the bedtime routine.
 - d. Recognize and reassure the family that with the right support and adherence to rehabilitation, individuals with burns can still lead a full life (Procter, 2010).
 - e. Consider psychosocial needs surrounding reintegration in greater community (see Psychosocial Needs section)
 - f. Educate the family on the treatment plan and expected outcomes to help alleviate stress and anxiety surrounding re-integration (Ohgi & Gu, 2013).

- g. Peer support groups can help facilitate re-integration into social settings and build a community of peers (Ohgi & Gu, 2013).
 - i. Exposure to peer support groups may have a positive impact on emotional health and self-esteem.
 - ii. Burn Camps offer children an opportunity to spend time with other burn survivors, have fun, and build self-esteem
 - 1. <http://www.iaburncamps.org/> ← a website to find a Burn Camp near you
 - 2. <https://www.phoenix-society.org/resources/burn-camps-offer-unique-growth-opportunities> ← Phoenix Society for Burn Survivors's Webpage describing Burn Camps, how to find one that is a good fit for a specific child, and offer additional resources
- h. Social stories or role playing potential social situations may help build confidence and prepare for negative social interactions
 - i. Phoenix Society for Burn Survivors offers social support:
 - 1. <https://www.phoenix-society.org/what-we-do/virtual-support>
 - 2. <https://www.phoenix-society.org/phoenix-soar> ← information on a peer support program
 - ii. Phoenix Society for Burn Survivors has a social story about a young girl with burn scars returning to school
 - 1. <https://www.phoenix-society.org/what-we-do/saras-steps>

11. Scar Management

- a. Early intervention (Aghajanzade et al., 2019)
 - i. Important to avoid long term complications, and begin the healing process early on in epithelialization of the burn area
- b. Massage (Valladares-Poveda et al., 2020)
 - i. Can lead to decreased scar vascularity
 - 1. Should be discussed with practitioner for best massage methods
 - 2. Most effective in conjunction with other treatments

- ii. Both structured and unstructured show equal benefits, though unstructured is more cost-effective
- c. Passive and active range of mobilization (Aghajanzade et al., 2019)
 - i. Reduces the likelihood of contractures and avoid wrinkling of the affected area
- d. Splinting (Aghajanzade et al., 2019)
 - i. Helps to avoid wrinkling and likelihood of contractures in the future
- e. Silicone treatments (Silverstein et al., 2011)
 - i. Merpillex Ag (MAg) and Silver sulfadiazine cream (SSD) when applied to the burn site can increase healing of the scar, keeping the area moist and assisting in the prevention of wrinkling and contractures
 - 1. MAg is a patch, SSD is a cream
 - 2. MAg more cost effective than SSD
 - 3. MAg is easier to use than SSD
 - 4. SSD has a higher rate of healing compared to MAg
 - 5. MAg and SSD are equal in pain management capabilities

12. Stretching

- a. Joints affected by burns should be stretched several times a day, and is likely to require assistance (Procter, 2010)
 - i. Helps maintain ROM and prevent contractures
 - ii. Stretches should be done several times a day to maximum functional range
 - iii. Client should be encouraged to complete independently when possible
- b. Younger children/clients may need encouragement from their parents to participate (Procter, 2010)
 - i. Include age appropriate games as interventions such as playing catch with a ball, playing a board game, playing Simon Says, using video games such as the Nintendo Wii (Ohgi & Gu, 2013)
 - ii. Parents/caregivers might need additional reassurance that although participation and completion of stretching (and other exercise interventions) may cause temporary discomfort and distress to their child, it will benefit them in the future (Andres et al., 2017).

- iii. Parents/caregivers should be taught how to complete stretches so that they can assist their child
- c. Important to control pain throughout stretching to decrease fear with movement (Procter, 2010)
- d. Stretching may be paired with splinting to manage contracted scar tissue (Procter, 2010)
- e. UW Medicine Regional Burn Center in Seattle WA has developed several videos describing stretches for specific areas of the body. There are videos in both English and Spanish
 - i. https://www.youtube.com/playlist?list=PLFEMTIzjmLeUC-tONmpxadXa7rusm_B6

Tips to Promote Adherence to Treatment:

- Parent confidence in ability to help with treatment independently (Andrews et al., 2017)
- Address parent's emotional burden and recognize how it can impact parent's ability to follow a treatment plan at home (Andrews et al., 2017)
 - Anticipate potential conflict between a healthcare professional's recommendation for treatment (pressure garment, stretching, orthoses) may result in temporary distress from the child (Brown, 2002).
- Important to get parent/caregiver buy-in to assist with adherence to stretching routine. Increased parent/caregiver confidence will allow them to better integrate the routine into the child's daily routine (Andrews et al., 2017).

Link to CCS Website:

<https://sites.google.com/view/ccsrdw/search-by-diagnosis/rare-diagnoses/burns#h.2jzib2uhzw15>

Different Modalities for Interventions and Cost

Intervention	Cost (Updated on 3/20/2023)	Other cost-related notes
Silicone Gel Patches	<p>Wifamy Silicone Scar Sheets: \$9.99 for 4 sheets (\$2.49/count)</p> <p>Areza Silicone Gel Sheet: \$14.24 for 3 sheets (\$4.75/count)</p>	<p>Each can be reused until adhesive is exhausted.</p> <p>Do not withstand water submersion.</p>
Topical Silicone Gel	<p>Glavedo Advanced Medical Silicone Scar Gel: \$12.97 for 1.45 oz</p>	<p>Allows skin to breathe.</p>
Pressure Compression Garment	<p>Tubigrip: \$32.69 for 33 feet</p> <p>Vest for trunk: \$126.42-142.49 depending on size</p>	<p>Reusable indefinitely, customizable, client may require replacement if they grow out of size.</p> <p>Also typically covered through insurance.</p>
Silver sulfadiazine cream	<p>Curad Silver Solution Antimicrobial Gel \$.8.99/0.5 oz container</p> <p>Silver Miracles Colloidal Silver Cream \$23.45/4 net oz</p>	<p>Over the counter treatment, variety of brands and either cream or gel form.</p>

Appendix B: Burn Page and Email Announcement



1 MINUTE READ

BURN & SCAR MANAGEMENT

Burn Depths



Common Burn Types

- Flame
- Contact
- Scald or grease
- Flash: i.e. lighting a grill & there is a large, fast source of heat
- Electrical
- Radiation: i.e. sunburn, cancer-related injuries
- Chemical
- Cold burn (aka frostbite)
- Friction: i.e. road rash, sports injury on turf
- Inhalation

Common Free Assessments

- Total Body Surface Area = TBSA %
- Cutaneous Functional Units
- Baux Score = (% body surface burned) + (patient's age); scores over 140 are considered survivable with sufficiently available treatment resources
- Goniometry
- Taking photos of the burn/scar over time
- Vancouver Scar Scale (& Modified VSS)
- Brisbane Burn Scar Impact Profile
- Patient & Observer Scar Assessment Scale

Common Rehab Interventions

- Compression, including custom pressure garments
 - Need 25 mmHg pressure 23 hrs/day
- Scar massage
- Contracture management
 - Orthoses
 - Positioning
 - Stretching
- Desensitization
- Edema management
- Exercise via functional movements & tasks (goals: preserve motion, prevent deformity, promote tendon gliding, promote active muscle function), including AROM, PROM, AAROM
- Pain management & coping skills

Resources

- Alisa Ann Ruch Burn Foundation
 - Many camps, retreats, & meet ups in California
 - Monthly virtual meetings
 - Peer support
 - Financial assistance
- American Burn Association
 - Practice guidelines
 - OT/PT special interest group
- Children's Burn Foundation

MORE INFORMATION HERE

INCLUDING REFERENCES FOR ALL MATERIAL ON THIS PAGE

Appendix C: Search Tracking Table from CAT

Search Terms/Strategies	Date Searched	Resource Used (database, search engine)	# Hits	# Excluded	# Kept (any repeats?)	Contributor
Burn AND scar AND occupational therapy intervention OR occupational therapy treatment AND pediatric AND functionality AND quality of life AND cost-effective OR cheap OR affordable AND effective	July 6, 2022	MedLine	0	0	0	GB
Burn AND scar AND occupational therapy intervention OR occupational therapy treatment AND pediatric AND functionality AND quality of life AND cost-effective OR cheap OR affordable	July 6, 2022	MedLine	0	0	0	GB
Burn AND scar AND occupational therapy intervention OR occupational therapy treatment AND pediatric AND quality of life AND cost-effective OR cheap OR affordable	July 6, 2022	MedLine	0	0	0	GB
Burn AND scar AND occupational therapy intervention OR occupational therapy treatment AND pediatric AND cost-effective OR cheap OR affordable	July 6, 2022	MedLine	1	0	1	GB
Burn AND pediatric	July 6, 2022	AJOT	5	5	0	GB
((burn) AND (scar)) AND (occupational therapy) AND (pediatric) AND (functionality) AND (quality of life)	July 6, 2022	PubMed	4	4	0	GB

Burn AND scar AND pediatric AND cost-effective	July 6, 2022	CJOT	1	0	1	GB
Burn AND scar AND occupational therapy intervention OR occupational therapy treatment AND pediatric AND functionality AND quality of life AND cost effective	July 6, 2022	CINAHL	0	0	0	GB
Burn AND scar AND occupational therapy intervention OR occupational therapy treatment AND pediatric AND functionality AND cost effective	July 6, 2022	CINAHL	0	0	0	GB
Burn AND scar AND occupational therapy intervention AND pediatric AND cost effective	July 6, 2022	CINAHL	0	0	0	GB
Burn AND scar AND occupational therapy AND pediatric AND cost effective	July 6, 2022	CINAHL	0	0	0	GB
Burn AND scar AND occupational therapy intervention AND pediatric OR children AND functionality AND quality of life AND cost effective OR cheap	July 6, 2022	ERIC	1	1	0	GB
Burn AND scar AND occupational therapy intervention AND pediatric AND cost effective	July 6, 2022	ERIC	0	0	0	GB
Burn AND scar AND occupational therapy intervention AND pediatric AND cost effective	July 6, 2022	PsycInfo	0	0	0	GB
Burn AND occupational therapy AND pediatric AND cost effective	July 6, 2022	PsycInfo	1	1	1 (same article as before, Brown et. al)	GB
Burn AND scar AND pediatric AND intervention	July 6,	OT Seeker	0	0	0	GB

AND cost effective AND quality of life	2022					
Burn AND pediatric AND intervention	July 6, 2022	OT Seeker	7	6	1	GB
Occupational therapy AND occupational therapy intervention AND occupational therapy treatment AND burn AND scar AND pediatric	July 6, 2022	Journal of Burn Care & Research	1	0	1	GB
Burn AND scar AND pediatric AND intervention	July 6, 2022	AJOT	6	5	1	MS
scar management AND pediatric AND intervention AND burn AND effective	July 6, 2022	AJOT	34	33	1 (same as above, Melchert-McKearnan)	MS
burn AND scar AND pediatric AND treatment AND cost-effective	July 8, 2022	PubMed	4	1	3 (2 new, 1 already included)	MS
burn AND scar AND pediatric AND (Occupational Therapy intervention OR OT intervention)	July 8, 2022	PubMed	1	0	1 (Already included)	MS
burn AND scar AND pediatric AND treatment AND cost effective OR low income AND occupational therapy	July 8, 2022	NCBI (Literature), (clinicaltrials.gov)	0	0	0	MS
burn scar AND scar management AND pediatric AND cost effective AND occupational therapy AND intervention AND effective AND quality of life AND functional (filter: peer reviewed)	July 8, 2022	NCBI (PubMed Central)	51	48	5	MS

burn AND pediatric AND scar management AND cost-effective	July 8, 2022	PubMed	2	0	2 (already included)	MS
Burn AND scar AND occupational therapy intervention OR occupational therapy treatment AND pediatric AND functionality AND quality of life AND cost effective	July 8, 2022	PubMed	2	2	0	MS
Burn AND scar management AND occupational therapy intervention OR occupational therapy treatment AND pediatric AND functionality AND quality of life	July 8, 2022	PubMed	40	40	0	MS
Burn AND scar AND pediatric AND intervention AND cost effective AND quality of life	July 18, 2022	AJOT	2	2	0	MS
Burn AND pediatric AND intervention AND cost effective	July 18, 2022	AJOT	20	20	0	MS
Burn AND pediatric AND intervention	July 18, 2022	AJOT	37	35	2 (one repeat)	MS
burns or burn injury or burns trauma AND pediatric or child or children or infant or adolescent AND interventions or strategies or best practices AND quality of life	July 18, 2022	Sport Discus	9	5	4	MS
Burn AND scar AND occupational therapy AND pediatric OR children AND affordable	July 22, 2022	MedLine	57	50	3 (+ 4 repeats)	GB
Burn AND scar AND occupational therapy AND	July 22,	CINAHL	1	1	0	GB

pediatric AND cost effective OR cheap	2022					
Burn AND scar AND occupational therapy AND children AND cost effective OR cheap	July 22, 2022	CINAHL	0	0	0	GB
Occupational therapy AND scar management AND cost effective AND intervention AND pediatric OR children AND quality of life	July 22, 2022	Journal of Burn Care & Research	41	38	2 (+ 1 repeat)	GB
Occupational therapy AND scar AND cost effective AND intervention AND pediatric AND quality of life	July 22, 2022	Journal of Burn Care & Research	35	32	3 repeats	GB
Occupational therapy AND scar AND cheap AND intervention AND children AND quality of life	July 22, 2022	Journal of Burn Care & Research	1	1	0	GB
Occupational therapy AND scar AND affordable AND intervention AND pediatric	July 22, 2022	Journal of Burn Care & Research	7	7	0	GB
Occupational therapy AND scar AND affordable AND pediatric	July 22, 2022	Journal of Burn Care & Research	8	8	0	GB
Occupational therapy AND scar AND cheap AND pediatric	July 22, 2022	Journal of Burn Care & Research	0	0	0	GB
Occupational therapy AND scar AND cost effective AND pediatric	July 22, 2022	Journal of Burn Care & Research	49	46	3 repeats	GB
burn or burn injury or burn scar AND pediatric or	July 25,	Sportdiscus	3	3	0	MS

child or children or adolescent AND interventions or strategies or best practices AND affordable	2022					
burn or burn injury or burn scar AND pediatric or child or children or adolescent AND occupational therapy	July 25, 2022	Sportdiscus	6	3	3 repeats	MS
burn or burn injury or burn scar AND pediatric or child or children or adolescent AND occupational therapy AND treatment or intervention	July 25, 2022	Sportdiscus	5	2	3 repeats	MS
Occupational therapy AND burns or burn or burn trauma AND scar AND intervention	July 25, 2022	Sportdiscus	3	0	3 repeats	MS
Occupational therapy AND burns or burn or burn trauma AND intervention AND cost effective OR affordable	July 25, 2022	Sportdiscus	0	0	0	MS
Occupational therapy AND burns or burn or burn trauma AND intervention OR treatment OR therapy AND pediatric	July 25, 2022	Sportdiscus	1	1	0	MS
Occupational therapy AND scar management AND cost effective AND pediatric OR children AND quality of life	July 25, 2022	Sportdiscus	0	0	0	MS
Occupational therapy AND scar management AND pediatric OR children AND quality of life	July 25, 2022	SportDiscus	1	0	1 repeat	MS
Occupational therapy AND burn management AND pediatric	July 25, 2022	PsychInfo	1	0	1 repeat	MS
Occupational therapy AND burn management AND pediatric AND scar	July 25, 2022	PsychInfo	1	0	1 repeat	MS

Burn OR burn management AND scar AND pediatric AND cost effective	July 25, 2022	PsychInfo	0	0	0	MS
Burn AND scar AND Occupational Therapy Intervention AND pediatric AND functionality AND cost-effective	July 26, 2022	JSTOR	9	9	0	GG
Occupational Therapy AND scar AND pediatric	July 26, 2022	JSTOR	40	40	0	GG
Burn AND scar AND Occupational therapy intervention OR occupational therapy treatment AND pediatric AND functionality AND cost-effective	July 26, 2022	JSTOR	54	54	0	GG
Occupational therapy AND chronic scar OR burn management AND pediatric NOT adults AND intervention AND cost-effective	July 26, 2022	JSTOR	37	37	0	GG
Occupational Therapy AND chronic scar management AND pediatric NOT adult AND affordable	July 26, 2022	JSTOR	1	1	0	GG
Occupational therapy intervention AND scar treatment AND children NOT adults	July 26, 2022	JSTOR	12	12	0	GG
burn AND scar AND occupational therapy AND under 21 AND well being AND affordable AND optimal	July 26, 2022	JSTOR	9	9	0	GG
Chronic scar management AND pediatric OR children AND treatment AND remedy	July 26, 2022	BJOT	0	0	0	GG
Chronic scar AND pediatric AND Occupational therapy intervention AND range of motion	July 26, 2022	BJOT	2	2	0	GG

Chronic scar OR burn protocol AND pediatric patients OR children NOT adults AND occupational therapy	July 26, 2022	BJOT	0	0	0	GG
Scar management AND adolescents OR pediatric AND protocol OR treatment OR therapy	July 26, 2022	BJOT	7	7	0	GG
Scar management AND intervention AND children OR pediatrics OR adolescent NOT adult AND functionality	July 27, 2022	CJOT	3	3	0	GG
Scar treatment AND children OR pediatrics AND intervention OR therapy	July 27, 2022	CJOT	12	12	0	GG
Heat trauma OR burn OR scald AND scar management OR chronic scar AND children OR pediatrics OR adolescent	July 27, 2022	CJOT	1	1	0	GG
Burn AND scar management AND children OR pediatrics OR adolescent AND therapy OR intervention AND affordable	July 27, 2022	CJOT	0	0	0	GG
Burn OR scar AND intervention OR treatment OR protocol AND children OR pediatrics OR adolescent	July 27, 2022	CJOT	44	44	0	GG
Burn OR scar AND intervention AND children OR pediatric NOT adults NOT women AND contracture OR range of motion AND occupational therapy AND quality of life	July 27, 2022	CJOT	79	79	0	GG
Occupational therapy AND burn management AND pediatric AND scar	August 2, 2022	PLoS	8	8	0	KR
Occupational therapy AND burn scar AND pediatric	August	PLoS	13	13	0	KR

	2, 2022					
Occupational therapy AND burn management AND adolescents AND scar AND treatment	August 2, 2022	PLoS	10	10	0	KR
Occupational therapy AND burn management AND scar AND treatment	August 2, 2022	PLoS	37	33	4	KR
Burn management AND scar treatment AND pediatric AND therapy	August 2, 2022	PLoS	62	59	3	KR
Occupational therapy AND burn management AND scar AND functional AND pediatric	August 2, 2022	PLoS	7	7	0	KR
Outcome measurement tools currently used to assess pediatric burn patients: an occupational therapy and physiotherapy perspective	September 23	PubMed	33	31	2	GG
Hypertrophic Scar Formation Following Burns and Trauma: New Approaches to Treatment	September 23	PLoS	94	94	0	
Occupational therapy AND burn management AND pediatric AND scar	September 25	JRM	0		0	MS
Occupational therapy AND burn management		JRM	0	0	0	MS
burn		JRM	1	1	0	MS
Occupational therapy		JRM	22	22	0	MS
Occupational therapy AND burn management AND pediatric		JAMA	28	28	0	MS
Burn AND scar management AND pediatric		JAMA	42	42	0	MS

Occupational therapy AND burn care AND adolescents		JAMA	21	21	0	MS
Pediatric AND burn AND scar AND intervention	September 25, 2022	Journal of Hand Therapy	12	11	1	KR
Children AND burn AND scar AND intervention	September 25, 2022	Journal of Hand Therapy	26	25	1 (repeat)	KR
Adolescents AND burn AND scar AND treatment	September 25, 2022	Journal of Hand Therapy	10	10	0	KR
Occupational therapy AND burn care AND adolescents	September 25, 2022	Journal of Hand Therapy	6	6	0	KR
Burn scar AND treatment AND functional	September 25, 2022	Journal of Hand Therapy	76	76	0	KR

Appendix D: Master Citation Table from CAT

Citation	Include?	Maybe include?	Final decision (Y/N)	If not included, reason to exclude	Reviewer (our initials)	Cat table entry
<p>Aarabi, S., Longaker, M.T., Gurtner, G.C. (2007) Hypertrophic scar formation following burns and trauma: New approaches to treatment. <i>PLoS Med</i> 4(9): e234. doi:10.1371/journal.pmed.0040234</p>	N		N	<p>No actual evidence or data. More theory based</p> <p>Review article with lots of cool resources (other linked articles) and a definitive conclusion</p>	KR	
<p>Andrews, N., Laura L. Jones, Moiemmen, N., Calvert, M., Kinghorn, P., Litchfield, I., Bishop, J., Deeks, J. J., & Mathers, J. (2017, September 15). Below the surface: Parents' views on the factors that influence treatment adherence in pediatric burn scar management — A qualitative study <i>Burns Open</i> 4(3). https://doi.org/10.1016/j.burns.2017.09.003</p>	Y		Y		KR	GB
<p>Anjana Bairagi, Bronwyn Griffin, Zephania Tyack, Dimitrios Vagenas, Steven M. McPhail, Roy Kimble. (2019). Comparative</p>	N		N	Describes a protocol	KR, MS	

effectiveness of Biobrane®, RECELL® Autologous skin cell suspension and silver dressings in partial thickness paediatric burns: BRACS randomised trial protocol, <i>Burns & Trauma</i> 7(33), 1-12. https://doi.org/10.1186/s41038-019-0165-0						
Baker, C. P., Russell, W. J., Meyer, W., & Blakeney, P. (2007). Physical and psychological rehabilitation outcomes for young adults burned as children. <i>Archives of Physical Medicine & Rehabilitation</i> , 88, S57–S64.	N		N	Study did not differentiate between types of interventions and the physical and psychological rehabilitative outcomes	MS	
Brown, N.J., David, M., Cuttle, L., Kimble, R.M., Rodger, S. & Higashi, H. (2015). Cost-effectiveness of a nonpharmalogical intervention in pediatric burn care. <i>Value in health: the journal of the International Society for Pharmacoeconomics and Outcomes Research</i> , 18(5), 631-637.	N		N	Intervention is about wound care procedures	GB, GG	
Brown, C.A. (2002). The use of silicon gel for treating children’s burn scars in Saudi Arabia: a case study. <i>Occupational therapy international</i> , 9(2), 121-130.	Y		Y		GB, GG	MS
Celis, M.M., Suman, O.E., Huang, T.T., Yen, P. & Herndon, D.N. (2003). Effect of a supervised exercise and physiotherapy	Y		Y		GB, GG	MS

<p>program on surgical interventions in children with thermal injury. <i>The Journal of Burn Care and Rehabilitation</i>, 24(1), 57-61.</p>						
<p>Chen, C. C., Heinemann, A. W., Bode, R. K., Granger, C. V., & Mallinson, T. (2004). Impact of pediatric rehabilitation services on children's functional outcomes. <i>The American Journal of Occupational Therapy</i>, 58(1), 44-53. https://doi.org/10.5014/ajot.58.1.44</p>	N		N	<p>Not specific to our topic- article is on the general impact of pediatric rehabilitation services.</p>	MS	
<p>Cowan, A. C., & Stegink-Jansen, C. W. (2013). Rehabilitation of hand burn injuries: Current updates. <i>Injury</i>, 44(3), 391-396.</p>	N		N	<p>General notes on the article:</p> <p>Splinting, exercises for ROM and fxnal mobility, adaptations.</p> <p>Single case study. Only mentions interventions briefly but good for major burn ideas in that it mentions exercises for strengthening and ROM, sensory re-education/desen sitization, etc.</p>	MS, GG	

<p>Cucuzzo, N.A, Ferrando, A., & Herndon, D. (2001). The effects of exercise programming vs traditional outpatient therapy in the rehabilitation of severely burned children. <i>The Journal of Burn Care & Rehabilitation</i>, 22(3), 214-220.</p>	<p>N</p>		<p>N</p>	<p>Measurement is focused on strength and functional outcome instead of scar appearance, color, etc</p>	<p>GB, GG, MS</p>	
<p>Farquhar, K. (1992). Silicone gel and hypertrophic scar formation: a literature review. <i>Canadian Journal of Occupational Therapy</i>, 59(2), 78- 86.</p>	<p>N</p>		<p>N</p>	<p>Outdated (1992)</p>	<p>GB</p>	
<p>Flores, O., Tyack, Z., Stockton, K., Ware, R., & Paratz, J. D. (2018). Exercise training for improving outcomes post-burns: a systematic review and meta-analysis. <i>Clinical Rehabilitation</i>, 32(6), 734–746.</p>	<p>N</p>		<p>N</p>	<p>Review and meta-analysis Update: Doesn't include info on intervention for burn scarring</p>	<p>MS</p>	
<p>Frear, C. C., Griffin, B. R., Cuttle, L., Kimble, R. M., & McPhail, S. M. (2021). Cost-effectiveness of adjunctive negative pressure wound therapy in paediatric burn care: evidence from the SONATA in C randomised controlled trial. <i>Scientific reports</i>, 11(1), 16650. https://doi.org/10.1038/s41598-021-95893-9</p>	<p>N</p>		<p>N</p>	<p>Wound care</p>	<p>MS</p>	<p>KR</p>
<p>Heath, K., Timbrell, V., Calvert, P. & Stiller, K. (2011). Outcome measurement tools currently used to assess pediatric burn patients: an occupational therapy and physiotherapy perspective. <i>Journal of Burn</i></p>	<p>N</p>		<p>N</p>	<p>Focuses on outcome measurement tools instead of intervention</p>	<p>GB, GG</p>	

<i>Care & Research</i> , 32(6), 600-607.						
Hanson, M.D., Gauld, M., Wathen, N. & MacMillan, H. (2008). Nonpharmacological interventions for acute wound care distress in pediatric patients with burn injury: a systematic review. <i>Journal of Burn Care & Research</i> , 29(5), 730-741.	N		N	Studies are primarily concerned with wound care Notes: systematic review	GB, GG, MS	
Ivers RQ, Hunter K, Clapham K, Coombes J, Fraser S, Lo S, Gabbe B, Hendrie D, Read D, Kimble R, Sparnon A, Stockton K, Simpson R, Quinn L, Towers K, Potokar T, Mackean T, Grant J, Lyons RA, Jones L, Eades S, Daniels J, Holland AJ. (2015) Understanding burn injuries in Aboriginal and Torres Strait Islander children: protocol for a prospective cohort study. <i>BMJ Open</i> , 5(10), 1-7. doi: 10.1136/bmjopen-2015-009826	N		N	Protocol	KR	
Joo, S.Y., Seung, Y.L., Yoon, S.C., & Cheong, H.S. (2020). Clinical utility of extracorporeal shock wave therapy on hypertrophic scars of the hand caused by burn injury: A prospective, randomized, double-blind study. <i>Journal of Clinical Medicine</i> (9), 5. doi:10.3390/jcm9051376	N		N	Participants are older than our age range	KR	
Jozsa, G., Vajda, P., Garami, A., Csenkey, A., & Juhasz, Z. (2018). Treatment of partial	N		N	Treatment is looking at wound	MS	

<p>thickness hand burn injuries in children with combination of silver foam dressing and zinc-hyaluronic gel: Case reports. <i>Medicine</i>, 97(13), e9991. https://doi.org/10.1097/MD.0000000000000991</p>				care vs chronic scar management		
<p>Killey, J., Simons, M., & Tyack, Z. (2021). Effectiveness of interventions for optimising adherence to treatments for the prevention and management of scars: A systematic review. <i>Clinical Rehabilitation</i>, 35(5), 656–668.</p>	N		N	Talks about adherence but not necessarily scar intervention	MS	
<p>Lee J.S., Sun K.H., Park Y. (2022). Evaluation of Melia azedarach extract-loaded poly (vinyl alcohol)/pectin hydrogel for burn wound healing. <i>PLoS ONE</i> 17(6): e0270281. https://doi.org/10.1371/journal.pone.0270281</p>	N		N	No human population was used in the study, deals with acute wound care	KR, MS	
<p>Melchert-McKearnan, K., Deitz, J., Engel, J. M., & White, O. (2000). Children with burn injuries: Purposeful activity versus rote exercise. <i>The American Journal of Occupational Therapy</i>, 54(4), 381–390. https://doi.org/10.5014/ajot.54.4.381</p>	N		N	Looks at measures of pain instead of scarring	MS	
<p>Rowe, G., Edgar, D.W., Osborne, T., Fear, M., Wood, F.M., Kenworthy, P. (2022) Does exercise influence burn-induced inflammation: A cross-over randomised</p>	N		N	Participants are older than our age of inclusion (ages range from 28-58)	KR	

controlled feasibility trial. <i>PLoS ONE</i> 17(4): e0266400. https://doi.org/10.1371/journal.pone.0266400						
Sasor, S.E., Chung, K.C.. (2019). Upper extremity burns in the developing world: A neglected epidemic. <i>Hand Clin</i> , 35(4), 457-466. doi: 10.1016/j.hcl.2019.07.010	N		N	Primarily discusses existing research and literature. No actual data.	KR	MS
Schneider, J.C., Trinh N.H.T., Selleck E., Fregni F., Salles S.S., Ryan, C.M., Joel, S. (2012). The long-term impact of physical and emotional trauma: The station nightclub fire. <i>PLoS ONE</i> 7(10): e47339. doi:10.1371/journal.pone.0047339	N		N	Population are older than our age of inclusion (>30), looking at other outcomes	KR, MS	
Silverstein, P., Heimbach, D., Meites, H., Latenser, B., Mozingo, D., Mullins, F., Garner, W., Turkowski, J., Shupp, J, Glat, P. & Purdue, G. (2011). An open, parallel, randomized, comparative, multicenter study to evaluate the cost-effectiveness, performance, tolerance, and safety of a silver-containing soft silicone foam dressing (intervention) vs silver sulfadiazine cream. <i>The Journal of Burn Care & Research</i> , 32(6), 617-626.	Y		Y		GB, GG	GB
Spronk, I., Van Loey, N.E.E., Sewalt, C., Nieboer, D., Renneberg, B., Moi, A.L., Oster, C., Orwelius, L., van Baar, M.E., Polinder, S., the Quality of life study group.	N		N	Notes- meta analysis looks at adults with burns	KR	

<p>(2020). Recovery of health-related quality of life after burn injuries: An individual participant data metaanalysis. <i>PLoS ONE</i> 15(1): e0226653. https://doi.org/10.1371/journal.pone.0226653</p>						
<p>Tyack, Z., Kimble, R., Mcfail, S., Plaza, A., Simons, M. (2017). Psychometric properties of the Brisbane Burn Scar Impact Profile in adults with burn scars. <i>PLoS One</i>, 12(9), 1-21. . https:// doi.org/10.1371/journal.pone</p>	N		N	Participants are above the age range being studied, but could have helpful info to look at	KR	
<p>Valladares-Poveda, S., Avendaño-Leal, O., Castillo-Hidalgo, H., Murillo, E., Palma, C., & Parry, I. (2020). A comparison of two scar massage protocols in pediatric burn survivors. <i>Burns : journal of the International Society for Burn Injuries</i>, 46(8), 1867–1874. https://doi.org/10.1016/j.burns.2020.05.013</p>	Y		Y		KR	GB
<p>Van Yperen, D.T., Van der Vlies, C.H., De Faber, J.T.H.N., Smit, X., Polinder, S., Penders, C.J.M., Van Lieshout, E.M.M, Verfhofstad, M.H.J, ROCKET Study Group. (2020). Epidemiology, treatment, costs, and long-term outcomes of patients with fireworks-related injuries (ROCKET); a multicenter prospective observational case series. <i>PLoS ONE</i> 15(3): e0230382.</p>	Y		Y	No discussion for intervention on burn scar	KR	

<p>https://doi.org/10.1371/journal.pone.0230382</p>						
<p>Wiechman, S. A., McMullen, K., Carrougher, G. J., Fauerbach, J. A., Ryan, C. M., Herndon, D. N., Holavanahalli, R., Gibran, N. S., & Roaten, K. (2018). Reasons for distress among burn survivors at 6, 12, and 24 months postdischarge: A burn injury model system investigation. <i>Archives of Physical Medicine & Rehabilitation</i>, 99(7), 1311–1317.</p>	N		N	Incorrect age range, doesn't include kids (under 18y/o)	MS	
<p>Wiseman, J., Simons, M., Kimble, R., Ware, R., McPhail, S. & Tyack, Z. (2021). Effectiveness of topical silicone gel and pressure garment therapy for burn scar prevention and management in children 12-months postburn: a parallel group randomised controlled trial. <i>Clinical Rehabilitation</i> 35(8), 1126-1141. doi: 10.1177/02692155211020351</p>	Y		Y		KR	GB
<p>Wiseman, J., Ware, R.S., Simons, M., McPhail, S., Kimble, R., Dotta, A. & Tyack, Z. (2020). Effectiveness of topical silicone gel and pressure garment therapy for burn and scar prevention and management in children: a randomized controlled trial. <i>Clinical Rehabilitation</i>, 34(1), 120-131.</p>	Y		Y		GB, GG	KR

<p>Mirastschijski, U., Sander, J., Zier, U., Rennekampff, H., Weyland, B. & Vogt, P. (2015). The cost of post-burn scarring. <i>Ann Burns Fire Disasters</i>, 28I(3), 215-222.</p>	<p>N</p>		<p>N</p>	<p>Incorrect age range. Does not include pediatric participants</p>	<p>GB</p>	
<p>Christine Tuden Neugebauer, MS, MT-BC, LPC, Michael Serghiou, LOT, David N. Herndon, MD, Oscar E. Suman, PhD, Effects of a 12-Week Rehabilitation Program With Music & Exercise Groups on Range of Motion in Young Children With Severe Burns, <i>Journal of Burn Care & Research</i>, Volume 29, Issue 6, November-December 2008, Pages 939–948, https://doi.org/10.1097/BCR.0b013e31818b9e0e</p>	<p>Y</p>		<p>Y</p>		<p>GG</p>	
<p>Przkora, R., Herndon, D. N., & Suman, O. E. (2007). The effects of oxandrolone and exercise on muscle mass and function in children with severe burns. <i>Pediatrics</i>, 119(1), e109–e116. https://doi.org/10.1542/peds.2006-1548</p>	<p>N</p>		<p>N</p>	<p>Outcome does not focus on scar management</p>	<p>GG</p>	

Appendix E: Collaborator Survey

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
You received access to information regarding which burn scar interventions are most effective and low-cost.	1	2	3	4	5
Information reached your clients, such that their adherence to intervention plan increased/will increase.	1	2	3	4	5
The overall wellbeing and quality of life of your burn scar clients and their families improved/will improve following the translation of this information.	1	2	3	4	5
Your treatment of clients with burn scars will evolve following the translation of this information.	1	2	3	4	5
Your treatment of clients with burn scars was affirmed following the translation of this information.	1	2	3	4	5
You feel satisfied with the level of rigor and depth of information received as a result of this collaboration.	1	2	3	4	5

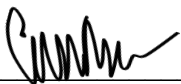
Acknowledgements

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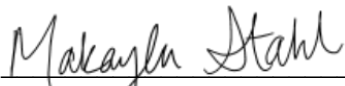
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Signature of MSOT Student

Name: Makayla Stahl Date: 03/31/2023



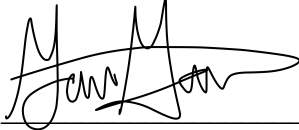
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Name: Kaytie Ridle Date: 03/31/2023



Signature of MSOT Student

Name: Gabrielle Golinvaux Date: 03/31/2023



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