AVANOS

GAME READY CLINICAL COMPENDIUM

GAME READY

The Clinical Compendium consists of a literature summary surrounding the use of the GAME READY GRPro 2.1, Med4 Elite, and predicate devices. It is an abridged list of studies, and readers are advised to review all relevant sources for complete information. Study summaries are organized by patient population and include a link to the abstract on PubMed (National Library of Medicine).

SELECTION CRITERIA FOR STUDY SUMMARIES:

- GAME READY published literature in peer-reviewed journals
- Study designs:
    - Prospective
    - Retrospective
    - Meta-Analysis
- Studies available in the English language
- Exclusion criteria:
    - Poster presentations
    - Abstracts
    - Study protocols
- Categories:
    - Studies by anatomical location
    - Recovery & athletics
    - Science
    - Safety & adverse events
    - Review articles & clinical education

This compendium is a balance of favorable, neutral, and unfavorable studies proportional to the number published in the literature.

ABBREVIATIONS:

- **ACL** – Anterior Cruciate Ligament
- **CC** – Cryo-Compression
- **DOMS** – Delayed-Onset Muscle Soreness
- **KOOS** – Knee Injury and Osteoarthritis Outcome Score
- **ROM** – Range of Motion
- **THA** – Total Hip Arthroplasty
- **TKA** – Total Knee Arthroplasty
- **VAS** – Visual Analog Scale

GAME READY

READING THE CLINICAL COMPENDIUM: A SAMPLE GUIDE

Author	Year Published	Journal	Type
Lead Author Last Name	Publication Year	Journal Title	Type of Manuscript
Title	*Full Title of the Manuscript*		
Publication Overview	A background in what the study was investigating or discussing		
Summary Points	Take-home points that are supported by the data contained within the publication		
Link to Manuscript	Link		

In the corner, you will see one of the following icons, which indicate if a study directly mentions GR, CC devices, or contrast therapy devices.

Study uses a GR device (no specific model called out)

Study investigates CC devices with no manufacturer named

Study that reviews contrast therapy devices with no manufacturer named

GAME READY

SHOULDER

SHOULDER

Author	Year Published	Journal	Type
Kraeutler	2015	Journal of Shoulder and Elbow Surgery	Randomized Controlled Trial
Title	*Compressive Cryotherapy Versus Ice-A Prospective, Randomized Study on Postoperative Pain in Patients Undergoing Arthroscopic Rotator Cuff Repair or Subacromial Decompression*		
Publication Overview	Study to compare the efficacy of CC therapy versus ice on postoperative pain in patients undergoing shoulder arthroscopy for rotator cuff repair or subacromial decompression.		
Summary Points	No significant post-operative pain relief benefits were found in patients who used CC therapy versus ice. No significant differences were found in average pain, worst pain, or morphine equivalent dosage post-procedure.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/25825138/		

Author	Year Published	Journal	Type
Dickinson	2017	Journal of Shoulder and Elbow Surgery	Systematic Review
Title	*A Systematic Review of Cost-Effective Treatment of Postoperative Rotator Cuff Repairs*		
Publication Overview	Study to evaluate cost-effective, high-quality postoperative rehabilitation dosing and cryotherapy for patients undergoing rotator cuff repair.		
Summary Points	Cryotherapy is favorable and cost-effective for patients undergoing rotator cuff repair.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/28314695/		

SPINE

SPINE

Author	Year Published	Journal	Type
Nabiyev	2018	Neurospine	Cross-Sectional Study
Title	*Cryo-Compression Therapy After Elective Spinal Surgery for Pain Management: A Cross-Sectional Study With Historical Control*		
Publication Overview	Study to analyze the analgesic efficacy of CC therapy in adult patients following lumbar spinal surgery.		
Summary Points	A positive association was found between CC therapy and accelerated improvement during early rehabilitation post-procedure compared with patients who were treated with narcotics only.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/30531660/		

Author	Year Published	Journal	Type
De Bie	2021	Orthopaedics & Traumatology, Surgery & Research	Retrospective Study
Title	*Enhanced Recovery After Lumbar Fusion Surgery: Benefits of Using Game Ready©*		
Publication Overview	Study to evaluate the impact of a CC device on post-procedure analgesia following lumbar fusion.		
Summary Points	A CC device is an effective method to control post-procedure pain in spine surgery. Device usage decreased the consumption of analgesics, limited blood loss, reduced the need for transfusions, and contributed to enhanced recovery post-procedure.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/33957322/		

GAME READY

HIP & LEG

HIP & LEG

Author	Year Published	Journal	Type
Leegwater	2012	Hip International	Clinical Trial
Title	*Cryocompression Therapy After Elective Arthroplasty of the Hip*		
Publication Overview	Study to evaluate the effects of combined CC in THA.		
Summary Points	The CC group reported lower morphine usage, shorter hospital admission times, and less wound discharge than control. Intermittent CC appeared to reduce post-procedure blood loss. No difference was found in post-procedure pain scores.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/23112075/		

Author	Year Published	Journal	Type
Leegwater	2017	Injury	Randomized Controlled Trial
Title	*Postoperative Continuous-Flow Cryocompression Therapy in the Acute Recovery Phase of Hip Fracture Surgery- A Randomized Controlled Clinical Trial*		
Publication Overview	Study to evaluate the efficacy of continuous flow CC therapy in the acute recovery phase following hip fracture surgery.		
Summary Points	A mild analgesic effect was observed at 72 hours post-procedure in patients who completed the continuous flow CC treatment schedule. Continuous flow CC therapy was not found to add value in the acute recovery phase post-procedure.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/29079365/		

Author	Year Published	Journal	Type
Klaber	2019	Journal of Hip Preservation Surgery	Comparative Study
Title	*Compressive Cryotherapy is Superior to Cryotherapy Alone in Reducing Pain After Hip Arthroscopy*		
Publication Overview	Study to evaluate the effect of CC therapy in pain management and early discharge post-THA.		
Summary Points	The CC group reported lower pain scores during the early post-procedure phase and were discharged to home sooner when compared with the control group. A trend toward lower opioid analgesia usage was observed in the CC group.		
Link to Manuscript	https://academic.oup.com/jhps/article/6/4/364/5610188		

HIP & LEG

Author	Year Published	Journal	Type
Leegwater	2019	Journal of Orthopedic Surgery and Research	Multicenter Study
Title	*Continuous-Flow Cryocompression Therapy Penetrates to Bone Level in Hip Fracture Patients in a Numerical Simulation*		
Publication Overview	Study to observe deep tissue temperature during CC in post-procedure hip fracture patients.		
Summary Points	CC-induced analgesia was found to originate likely from skin analgesia, rather than muscle- or bone-derived pain analgesia. CC reduces temperature up to 3 cm and reaches the bone in cachectic patients, which may have implications for bone tissue healing with prolonged treatment.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/30764844/		

Author	Year Published	Journal	Type
Munsch	2022	Journal of Clinical Orthopaedics and Trauma	Retrospective Cohort Study
Title	*Patient-Specific Factors, But Neither Regional Anesthesia Nor Hip-specific Cryotherapy, Predict Postoperative Opioid Requirements After Hip Arthroscopy for Femoroacetabular Impingement (FAI) Syndrome*		
Publication Overview	Study to evaluate whether regional nerve blocks, CC delivery systems or patient-specific factors predict post-procedure opioid requirements and pain scores post-THA.		
Summary Points	Patient-specific factors are strong predictors of post-procedure opioid requirements. Regional nerve blocks and CC delivery systems did not affect opioid prescription amounts, opioid refill requests, and pain-related office visits post-procedure.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/35378774/		

GAME READY

KNEE

KNEE

Author	Year Published	Journal	Type
Su	2012	The Journal of Bone and Joint Surgery	Randomized Controlled Trial
Title	*A Prospective, Multi-Center, Randomised Trial to Evaluate the Efficacy of a Cryopneumatic Device on Total Knee Arthroplasty Recovery*		
Publication Overview	Study to investigate the efficacy of a CC device on post-TKA recovery.		
Summary Points	The CC device group demonstrated higher satisfaction scores and a greater distances walked at 6 weeks post-procedure. The CC device decreases the need for narcotic medication from hospital discharge to 2 weeks post-procedure. No differences were found in ROM, VAS, adverse events or knee circumference at 6 weeks post-procedure.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/23118406/		

Author	Year Published	Journal	Type
Waterman	2012	The Journal of Knee Surgery	Randomized Controlled Trial
Title	*The Efficacy of Combined Cryotherapy and Compression Compared With Cryotherapy Alone Following Anterior Cruciate Ligament Reconstruction*		
Publication Overview	Study to compare subjective and objective patient outcomes post-ACL reconstruction with CC versus traditional ice therapy.		
Summary Points	CC post-ACL reconstruction demonstrates improved, short-term pain relief and a greater likelihood for independence from narcotic use when compared with cryotherapy alone.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/22928433/		

Author	Year Published	Journal	Type
Murgier	2014	Orthopaedics & Traumatology, Surgery & Research	Case-Control Study
Title	*Cryotherapy With Dynamic Intermittent Compression for Analgesia After Anterior Cruciate Ligament Reconstruction. Preliminary Study*		
Publication Overview	Study to investigate the efficacy of CC in relieving post-procedure pain and restoring ROM post-ACL reconstruction.		
Summary Points	CC decreases analgesic drug requirements post-ACL reconstruction while improving post-procedure ROM recovery.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/24679367/		

KNEE

Author	Year Published	Journal	Type
Martimbianco	2014	Physical Therapy in Sport	Systematic Review
Title	*Effectiveness and Safety of Cryotherapy After Arthroscopic Anterior Cruciate Ligament Reconstruction. A Systematic Review of the Literature*		
Publication Overview	Study to evaluate the efficacy and safety of cryotherapy post-ACL reconstruction.		
Summary Points	The use of CC devices significantly reduced pain scores 48 hours post-procedure compared to no cryotherapy. The risk of adverse events did not differ between cryotherapy and control groups.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/24713365/		

Author	Year Published	Journal	Type
Song	2016	Springerplus	Meta-Analysis
Title	*Compressive Cryotherapy Versus Cryotherapy Alone in Patients Undergoing Knee Surgery: A Meta-Analysis*		
Publication Overview	Study to compare the efficacy of CC versus cryotherapy for knee surgery patients.		
Summary Points	CC is beneficial to patients undergoing knee surgery at the early rehabilitation stage. At the final rehabilitation stage, CC and cryotherapy alone demonstrated similar efficacy.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/27462522/		

Author	Year Published	Journal	Type
Chughtai	2016	The Journal of Knee Surgery	Review
Title	*Nonpharmacologic Pain Management and Muscle Strengthening Following Total Knee Arthroplasty*		
Publication Overview	Study to review non-invasive and novel modalities for neuromodulation in the treatment of pain and muscular weakness post-TKA.		
Summary Points	CC may help alleviate post-TKA pain. Cryotherapy, among other modalities, is a potential adjunct to current standard-of-care pharmacologic treatments to address post-procedure pain and muscle weakness.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/26683980/		

KNEE

Author	Year Published	Journal	Type
Schinsky	2016	Orthopedic Nursing	Randomized Controlled Trial
Title	*Multifaceted Comparison of Two Cryotherapy Devices Used After Total Knee Arthroplasty: Cryotherapy Device Comparison*		
Publication Overview	Study to compare the efficacy of a CC device versus ice/gel pack cryotherapy wrap post-TKA.		
Summary Points	The CC device group demonstrated similar objective patient outcomes and subjective patient satisfaction to the cryotherapy wrap group post-TKA. Hospital staff satisfaction and device costs favor the cryotherapy wraps.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/27648792/		

Author	Year Published	Journal	Type
Mistry	2016	Journal of Knee Surgery	Clinical Guidelines
Title	*Rehabilitative Guidelines After Total Knee Arthroplasty: A Review*		
Publication Overview	Guideline to investigate the role of rehabilitative methods for post-TKA patients.		
Summary Points	Most studies suggest that CC therapy is effective for postoperative pain relief and function, particularly as it decreases the metabolic activity of local tissues while providing external support and limiting the accumulation of soft-tissue swelling.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/26963074/		

Author	Year Published	Journal	Type
Gatewood	2017	Knee Surgery, Sports Traumatology, Arthroscopy	Systematic Review
Title	*The Efficacy of Post-Operative Devices Following Knee Arthroscopic Surgery: A Systematic Review*		
Publication Overview	Study to evaluate the efficacy of treatment methods used post-TKA.		
Summary Points	CC is among treatment methods recommended for inclusion in rehabilitation protocols post-TKA to address pain relieve, recovery of muscle strength and knee function.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/27695905/		

KNEE

Author	Year Published	Journal	Type
Murgier	2017	The Journal of Arthroplasty	Case-Control Study
Title	*Cryotherapy With Dynamic Intermittent Compression Improves Recovery From Revision Total Knee Arthroplasty*		
Publication Overview	Study to investigate the efficacy of CC in relieving post-procedure pain, decreasing blood loss and improving functional scores post-revision TKA.		
Summary Points	The CC group reported significantly lower total blood less, significantly less pain on day 3 and a significantly higher functional score compared with the control group. CC improves recovery for patients post-revision TKA.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/28465126/		

Author	Year Published	Journal	Type
Kacprzak	2020	Journal of Orthopaedics, Traumatology and Rehabilitation	Pilot Study
Title	*The Jumper's Knee - A New Look At Non-Surgical Treatment. Pilot Study*		
Publication Overview	Study to evaluate the efficacy of a novel conservative treatment approach in the time needed to return to sport.		
Summary Points	A novel conservative treatment approach generated promising results in the treatment of the jumper's knee. A 100% return to sport rate was reported among patients studied.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/33568571/		

Author	Year Published	Journal	Type
Sezer	2021	Orthopaedics & Traumatology, Surgery & Research	Retrospective Study
Title	*Early Postoperative Practices Following Anterior Cruciate Ligament Reconstruction in France*		
Publication Overview	Study to investigate early post-procedure practices following ACL reconstruction.		
Summary Points	Early post-procedure practices are related to surgical experience post-ACL reconstruction. The greater the surgical experience, the greater role of joint effusion prevention and self-rehabilitation.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/34537390/		

KNEE

Author	Year Published	Journal	Type
Mendes	2022	Therapeutic Hypothermia and Temperature Management	Review
Title	*Cryotherapy in Anterior Cruciate Ligamentoplasty Pain: A Scoping Review*		
Publication Overview	Study to evaluate the efficacy of cryotherapy on pain intensity in the immediate period post-ACL reconstruction.		
Summary Points	Cryotherapy is an effective treatment method to reduce pain intensity, demonstrating reductions in subjective pain scale scores post-ACL reconstruction. CC was found to be superior to conventional cryotherapy.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/35085042/		

Author	Year Published	Journal	Type
Marinova	2023	Knee Surgery, Sports Traumatology, Arthroscopy	Randomized Controlled Trial
Title	*The Role of a Cryocompression Device Following Total Knee Arthroplasty to Assist in Recovery: A Randomised Controlled Trial*		
Publication Overview	Study to evaluate the efficacy of a CC device versus usual care protocol on early post-procedure recovery following TKA.		
Summary Points	No significant differences were observed between the CC device group versus usual care protocol during or after cession of the intervention. The CC group demonstrated significant more knee extension gains during the initial 2 week intervention period, but the cause is undetermined.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/37464101/		

Author	Year Published	Journal	Type
Quesnot	2024	BMC Musculoskeletal Disorders	Randomized Controlled Trial
Title	*Randomized Controlled Trial of Compressive Cryotherapy Versus Standard Cryotherapy After Total Knee Arthroplasty: Pain, Swelling, Range of Motion and Functional Recovery*		
Publication Overview	Study to compare knee ROM at 21 days post-TKA between patients who used CC versus patients who used cryotherapy alone.		
Summary Points	Both cryotherapy methods reported improved joint ROM, trophic changes, pain and function. The CC group demonstrated a significantly faster improvement in passive knee flexion ROM, a greater reduction of swelling and lessened pain during activity. Walking distance and KOOS questionnaire were significantly better for the CC group.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/38419032/		

KNEE

Author	Year Published	Journal	Type
Belsey	2024	PloS One	Randomized Controlled Trial
Title	*A Randomised Crossover Trial of Five Cryocompression Devices' Ability to Reduce Skin Temperature of the Knee*		
Publication Overview	Study to compare the ability of five CC devices in reducing skin temperature to within a target therapeutic range.		
Summary Points	Two CC devices reduced skin temperature of the knee within the target therapeutic range of 10-15°C.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/38227605/		

GAME READY

RECOVERY & ATHLETICS

RECOVERY & ATHLETICS

Author	Year Published	Journal	Type
Chan	2016	Asia-Pacific Journal of Sports Medicine, Arthroscopy, Rehabilitation and Technology	Comparative Study
Title	*Comparison of Different Cryotherapy Recovery Methods in Elite Junior Cyclists*		
Publication Overview	Study to compare 3 methods to facilitate recovery in elite junior cyclists.		
Summary Points	No significant difference between average power output, blood lactate, rating of perceived exertion, and heart rate for two time-trial bouts was found between CC therapy, cold water immersion and active recovery treatment. CC therapy, cold water immersion and active recovery treatment are all useful recovery protocols between exercise sessions.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/29264264/		

Author	Year Published	Journal	Type
Statuta	2019	Clinics in Sports Medicine	Review
Title	*Training Room Procedures and Use of Therapeutic Modalities in Athletes*		
Publication Overview	Study to review current evidence and therapeutic methods used in athletic training rooms.		
Summary Points	Athletic trainers and physical therapists use a variety of therapeutic methods along with rehabilitation exercises to improve outcomes. Clinicians must be knowledgeable of the evidence for each method to optimize treatments and encourage recovery.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/31472770/		

Author	Year Published	Journal	Type
Cullen	2021	Current Sports Medicine Reports	Review
Title	*Passive Recovery Strategies After Exercise: A Narrative Literature Review of the Current Evidence*		
Publication Overview	Study to review the mechanisms and benefits for passive recovery strategies post-exercise to optimize athletic recovery.		
Summary Points	Compression garments, cold water immersion, and partial body cryotherapy, among other passive recovery techniques, improve athletic recovery. Passive recovery techniques help minimize the negative effects of training and enable the athlete to more quickly return to peak performance.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/34234090/		

RECOVERY & ATHLETICS

Author	Year Published	Journal	Type
Alexander	2022	Biology of Sport	Prospective Study
Title	*Effects of Contemporary Cryo-Compression on Post-Training Performance in Elite Academy Footballers*		
Publication Overview	Study to evaluate the immediate effects of CC on physiological and biomechanical measures in elite athletes following a fatiguing training session.		
Summary Points	Variable responses following exposure to CC (compared to passive recovery) suggests targeted and individualized recovery strategies are essential. Significant reductions in neuromuscular performance immediately following exposure to pneumatic CC devices may discourage this recovery strategy if neuromuscular mechanisms are required in the short term.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/35173358/		

Author	Year Published	Journal	Type
Driller	2023	Sports	Review
Title	*Fundamentals or Icing on Top of the Cake? A Narrative Review of Recovery Strategies and Devices for Athletes*		
Publication Overview	Study to review recovery strategies and devices for athletes in relation to the hierarchy of scientific evidence.		
Summary Points	Cryotherapy and compression garments are among strategies noted to have a high level of positive evidence for improved recovery outcomes.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/37999430/		

GAME READY

SCIENCE

SCIENCE

Author	Year Published	Journal	Type
Holwerda	2013	Sports Health	Experimental Study
Title	*Effects of Cold Modality Application With Static and Intermittent Pneumatic Compression on Tissue Temperature and Systemic Cardiovascular Responses*		
Publication Overview	Study to investigate whether higher levels of CC reduced tissue temperature and if cold modalities will cause acute increases in cardiovascular strain.		
Summary Points	The application of CC did not produce acute cardiovascular strain that exceeded the strain produced by standard ice bags/elastic wrap treatment. Greater temperature decreases were achieved with medium- and high-pressure settings when using the CC system.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/24381698/		

Author	Year Published	Journal	Type
Malanga	2015	Postgraduate Medicine	Review
Title	*Mechanisms and Efficacy of Heat and Cold Therapies For Musculoskeletal Injury*		
Publication Overview	Study to review the mechanisms of action, physiological effects, and clinical evidence that supports the clinical use of heat and cold therapies.		
Summary Points	The physiological effects of cold therapy include reductions in pain, blood flow, edema, inflammation, muscle spasm, and metabolic demand. Some evidence supports the use of cold therapy following acute musculoskeletal injury and DOMS.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/25526231/		

Author	Year Published	Journal	Type
Khoshnevis	2015	Knee Surgery, Sports Traumatology, Arthroscopy	Randomized Controlled Trial
Title	*Cold-Induced Vasoconstriction May Persist Long After Cooling Ends: An Evaluation of Multiple Cryotherapy Units*		
Publication Overview	Study to investigate the magnitude and persistence of vasoconstriction associated with cryotherapy.		
Summary Points	Cryotherapy can create a deep state of vasoconstriction in the local area of treatment. The condition of reduced blood flow persists long after local temperatures have rewarmed towards the normal range. This indicates that maintenance of vasoconstriction is not directly dependent on the continuing existence of a cold state.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/24562697/		

SCIENCE

Author	Year Published	Journal	Type
Karvat	2018	Einstein	Evaluation Study
Title	*Analysis of the Muscle Tissue of Wistar Rats Submitted to the Sciatic Nerve Compression Model and Cryotherapy*		
Publication Overview	Study to compare the effects of right sciatic nerve compression and cryotherapy on muscle tissue.		
Summary Points	Nerve injury reduced strength and muscle trophism (weight, diameter and area). Cryotherapy delayed hypotrophy during its application, but this effect did not last after ceasing treatment.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/30231143/		

Author	Year Published	Journal	Type
Ostrowski	2019	Journal of Sports Rehabilitation	Comparative Study
Title	*Effectiveness of Salted Ice Bag Versus Cryocompression on Decreasing Intramuscular and Skin Temperature*		
Publication Overview	Study to compare magnitude of muscle and skin cooling with a slated ice bag versus CC.		
Summary Points	A salted ice bag with elastic wrap compression and CC demonstrated equal intramuscular temperature decreases during the treatment period.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/29035620/		

Author	Year Published	Journal	Type
Priego-Quesada	2021	International Journal of Environmental Research and Public Health	Preliminary Study
Title	*Reproducibility of Skin Temperature Response After Cold Stress Test Using the Game Ready System: Preliminary Study*		
Publication Overview	Study to investigate the reproducibility of lower limb skin temperature after a cold stress test using a CC device.		
Summary Points	The cold stress test using a CC device showed a fair and good reproducibility, especially when the posterior leg region was assessed.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/34444044/		

SCIENCE

Author	Year Published	Journal	Type
Wan	2022	Computational and Mathematical Methods in Medicine	Evaluation Study
Title	*Evaluation of Application Effect of Self-Made Compression Cold Therapy in Postoperative Rehabilitation of Patients With Orthopedic Dyskinesia*		
Publication Overview	Study to investigate the application of self-made CC therapy in the rehabilitation of patients with orthopedic dyskinesia post-ankle fracture surgery.		
Summary Points	Many patients have post-procedure kinesiophobia due to pain. CC therapy can control refrigeration and reduce the possibility of tissue damage.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/35898488/		

GAME READY

SAFETY & ADVERSE EVENTS

SAFETY & ADVERSE EVENTS

Author	Year Published	Journal	Type
Jutte	2022	Journal of Sports Rehabilitation	Evaluation Study
Title	*Effects of 7 Consecutive Systematic Applications of Cryotherapy With Compression*		
Publication Overview	Study to investigate the occurrence of frostbite and measure skin temperatures during the systematic application of 2 CC protocols.		
Summary Points	The application of 7 consecutive CC treatments did not result in any signs or symptoms of frostbite. These applications produced similar skin temperatures with each active cycle.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/35042184/		

GAME READY

REVIEW ARTICLES & CLINICAL EDUCATION

REVIEW & CLINICAL EDUCATION

Author	Year Published	Journal	Type
Hsu	2019	Journal of Orthopaedic Trauma	Clinical Guidelines
Title	*Clinical Practice Guidelines For Pain Management in Acute Musculoskeletal Injury*		
Publication Overview	Guideline to provide recommendations to improve the management of acute pain following musculoskeletal injury.		
Summary Points	Balancing comfort and patient safety following acute musculoskeletal injury is possible when utilizing a true multimodal approach. Cryotherapy for acute musculoskeletal injury and the postsurgical orthopedic patient is conditionally recommended as an adjunct to other post-procedure pain treatments.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/30681429/		

Author	Year Published	Journal	Type
Hoffman	2021	Holistic Nursing Practice	Review
Title	*"Everything Old Is New Again": A Review of Current Complementary and Alternative Medicine Trends*		
Publication Overview	Study to review complementary and alternative medicine therapies that can be used as adjunct or preventative treatment methods to provide holistic care.		
Summary Points	Cryotherapy is indicated for pain relief in inflamed, injured, or overused muscles. It is often used in sports medicine for injury recovery and postseason recovery. Due to effects of decreased fatigue and stress, cryotherapy is also useful to promote overall wellness.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/34647911/		

Author	Year Published	Journal	Type
Kunkle	2021	JBJS Reviews	Review
Title	*Orthopaedic Application of Cryotherapy: A Comprehensive Review of the History, Basic Science, Methods, and Clinical Effectiveness*		
Publication Overview	Study to review the history, science, methods and clinical efficacy of cryotherapy in orthopedics.		
Summary Points	Cryotherapy helps reduce the production of inflammatory mediators, local edema and nerve conduction velocity while disrupting the overall inflammatory response. Continuous cryotherapy devices demonstrated the best outcome in post-TKA patients with a significant reduction in pain, swelling and analgesic consumption while increasing ROM.		
Link to Manuscript	https://pubmed.ncbi.nlm.nih.gov/33512971/		