EE338

Cost-effectiveness analysis of arthroscopic injection of a bioadhesive hydrogel implant in conjunction with microfracture for the treatment of focal chondral defects of the knee – an Australian perspective

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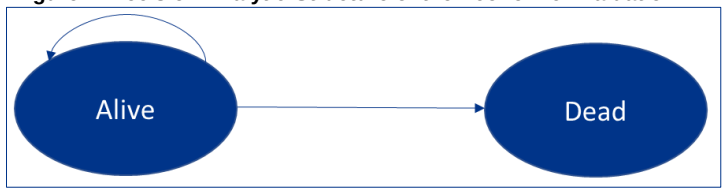
BACKGROUND AND OBJECTIVE

- Articular cartilage is avascular and has poor repair ability, thus, any injury or damage to the cartilage can affect joint function and mobility[1]
- JointRep, a novel Chitosan-based scaffold therapy, is a bioadhesive hydrogel arthroscopically injected to facilitate cartilage regeneration[2]
- This study aimed to compare the cost-effectiveness of JointRep with microfracture surgery compared to microfracture alone from the Australian healthcare system perspective, in patients with symptomatic focal chondral defects (Outerbridge Grade 3 or 4) of the knee who had failed conservative treatment and were indicated for surgery

METHODS

- A two-state de novo Markov model was developed (Figure 1)

Figure 1: Decision Analytic Structure of the Economic Evaluation



- **Time horizon:** Three years
- **Cycle length:** One year
- **Discount rate:** Costs and outcomes were discounted at 5%[3]
- **Model outcomes:** Costs, Quality-adjusted life years (QALYs), and Incremental cost-effectiveness ratio (ICER)
- **Patient baseline characteristics:** JointRep clinical trial[2]
- **Identical survival probability:** Applied in both treatment arms and calculated using Australian general population mortality risks[4]. No additional mortality risk assumed due to osteochondral defects
- **Efficacy measure:** Western Ontario and McMaster Universities Osteoarthritis index (WOMAC) Likert score recorded in JointRep trial
- **Utility:** Derived by mapping WOMAC scores to EQ-5D scores using a published algorithm (Table 1)[5]

Table 1: Model Utilities

Timepoint	JointRep + Microfracture		Microfracture alone	
	WOMAC Mean (SD)[a]	Utility[b]	WOMAC Mean (SD)[a]	Utility[b]
Baseline	56.5 (10.5)	0.419	54.7 (4)	0.479
Year 1[c]	-	0.907	-	0.654
0-6 months	7.1 (8.8)	0.899	27.3 (4.3)	0.709
6-12 months	4.6 (7.1)	0.915	40.7 (14.4)	0.599
Year 2	2.8 (5.6)	0.926	46.3 (12.8)	0.548
Year 3	3.9 (7.6)	0.920	47.5 (12.8)	0.541

SD=Standard Deviation; WOMAC=Western Ontario and McMaster Universities Osteoarthritis index; [a]WOMAC score ranges from 0-96 with higher score indicating worse HRQoL; [b]Weighted by gender distribution in each treatment arm; [c]Year 1 utility was calculated as an average of utility values estimated at 6 months and 12 months

Table 2: Cost Inputs Used in Model

Resource item	Total cost	Source/ Assumption
JointRep	AU$6,022	Prostheses List[9]
Surgical services[a]	AU$4,861	MBS Handbook[8]; AR-DRG[6,7]
Follow-up visit[b]	AU$34/visit	MBS Handbook[8]
MRI scan[c]	AU$605	MBS Handbook[8]

AR-DRG=Australian Refined Diagnosis Related Groups; MBS=Medicare Benefits Schedule; MRI=Magnetic Resonance Imaging; [a]Includes cost of pre- anesthesia consultation, initiation anesthesia, anesthesia, arthroscopic surgery for microfracture procedure, assistance, and hospital stays; [b]Model includes follow-up visit cost at year 1 (4 visits per year), and Year 2 onwards (2 visits per year); [c]Includes cost of 2 visits in Year 1

RESULTS

- JointRep with microfracture showed substantial QALY gain, and was found to be more cost-effective than microfracture alone [ICER: AU$6,328/ QALY gained] (Table 3)

Table 3: Results of Base-Case Analysis

	Total cost	Total QALYs	Incremental costs	Incremental QALYs	ICER ($/QALY)
JointRep + Microfracture	AU$12,996	2.61	AU$6,022	0.95	AU$6,328
Microfracture alone	AU$6,974	1.66	-	-	

Figure 2: One-way Sensitivity Analysis Results

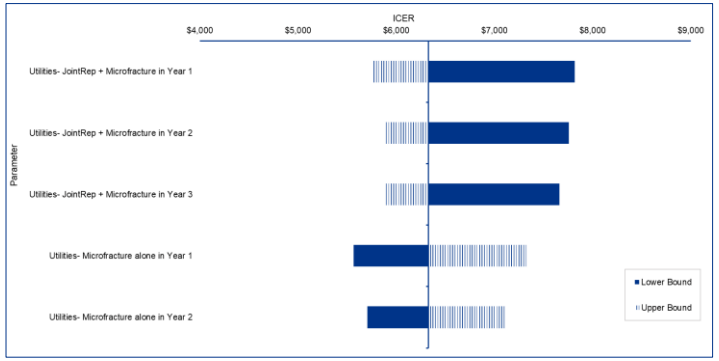
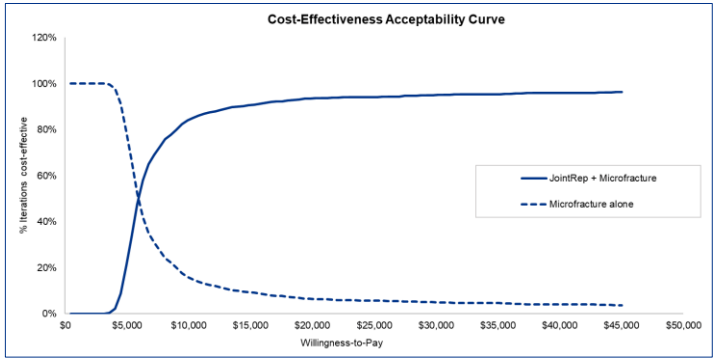


Figure 3: Probabilistic Sensitivity Analysis Results



CONCLUSION

- JointRep with microfracture may be a highly cost-effective treatment option compared to microfracture alone
- Model results were robust to varying parameters in sensitivity and scenario analysis
- Further exploration is required in large, randomized trials with longer follow-up duration

REFERENCES

1. Gracitelli GC, et al. Cochrane Database Syst Rev. 2016;9(9):Cd010675. **2.** Pipino G, et al. J Clin Orthop Trauma. 2019;10(1):67-75. **3.** MSAC Guidelines (v3.0). **4.** ABS Life tables (2018-20). **5.** Wailoo A, et al. Health Qual Life Outcomes. 2014;12:37. **6.** IHPA-NHCDC Round 23 (2018-19). **7.** IHPA- NEP (2021-22). **8.** MBS Handbook (Nov 2021). **9.** Prosthesis List Part A