Smith+Nephew

Improved efficiencies and outcomes: the health economic value of robotics in UKA

Healthcare systems globally are challenged with providing more patients better outcomes and at a lower cost. Patients are more engaged in their episode of care and expect better outcomes than previously. Patients want a quick recovery, with good functional outcomes and a durable implant. Administrators want the same, but they also need it to be done efficiently. UKA is a surgical procedure that treats osteoarthritis in a single compartment of the knee, for patients suffering from single compartment osteoarthritis UKA is a suitable alternative to TKA, which is more invasive and requires a longer recovery time.[1]

Patient satisfaction and TKA

TKA is a successful intervention for the treatment of end-stage arthritis, resulting in reductions in pain and improvements in function, whilst demonstrating long-term survivorship. **However, following TKA:**

Over 50% of patients report some degree of limitation to their functional ability at least 1-year post-operatively, including activities of daily living and sports activities[2]

Up to 20% of patients are not satisfied with their knee replacement[3]

Patient selection criteria and utilisation

of all TKA patients are candidates for UKA[4]

Although 25–47% of patients undergoing TKA are eligible for UKA,[4] only 8–15% of all knee arthroplasties are accounted for by UKA.[5] Low utilisation of UKA is partly accounted for by surgical complexity,[6,7] reduced threshold for revision,[7] and limited patient selection criteria.[8] With low usage, the revision risk is high, and this drives surgeons to perform UKA in a narrow group of patients leading to further reduced use.[8]

Robotically-assisted UKA (rUKA) and outcomes

When performed robotically, UKA provides patients with improved surgical outcomes,[9] irrespective of individual surgeon experience.[*10] Pre- and intra-operative surgical planning capabilities enable a personalised approach whilst alleviating surgical complexity.[11]

Up to **58%** reduced risk of revision[†12,13]

Compared with conventional techniques, robotic-assisted surgery has been shown to:

Improve accuracy of implant placement

- Robotic-assisted surgery improves implant placement when compared to a conventional technique[10,14,15]
- Robotic-assisted UKA allows surgeons of all experience levels to achieve improved accuracy[10]

Increase UKA implant survivorship[‡]

Aseptic loosening is a common cause of UKA revision in national joint registries[16]

- Accurate positioning of arthroplasty implants with robotic-assisted technology may reduce the impact of aseptic loosening, resulting in improved survivorship[16]
- Reduced revision rate (12 fewer revisions per 100 cases for rUKA)[17]

Better functional outcomes

rUKA patients have demonstrated significant improvements in functional outcomes including Knee Society Score[§] (KSS) and Oxford Knee Score (OKS) over conventional unicompartmental knee arthroplasty (cUKA; $p \leq 0.037$)[18,19]

Improved operating efficiencies and throughput

Increasing UKA utilisation results in several patient benefits which have been linked to improved cost efficiency versus TKA:[20]

- Reduced minor and major complications
- Reduced requirement for blood transfusions
- Reduced readmission rates

A relative increase in the number of UKA versus TKA can increase the capacity for patient throughput as **UKA requires fewer bed days** per patient than TKA.[21]

Table: Example of capacity release scenarios at a 300-knee procedure facility[¶21,22]

	Example current situation		Scenario 1		Scenario 2	
	TKA	UKA	TKA	UKA	TKA	UKA
Case mix	90%	10%	80%	20%	70%	30%
Bed days used	1,107	78	984	156	861	234
Cost of bed days utilised	**€1.06M**	**€75k**	**€944k**	**€150k**	**€826k**	**€224k**
Capacity released (bed days)	N/A		45		90	
Additional TKAs possible	N/A		11		22	

Performance optimised with Smith+Nephew

rUKA using RI.KNEE on CORI◊ Surgical System allows surgeons improved efficiency, accuracy and reproducibility compared to conventional instruments, while maintaining the extensive clinical benefits of UKA.[14,18,23-28]

Small footprint & portability

Featuring simple calibration and a small footprint, CORI Surgical System can easily be moved between operating rooms to support demand

Improved tray efficiency (reduced tray requirement from 2-3 to 1)

JOURNEY◊ II UK, when implanted using CORI Surgical System may only require a single tray to perform the surgery[29]

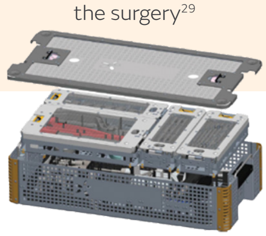

Image-free workflow

CORI Surgical System uses real-time imaging, eliminating the need for pre-op imaging (e.g. MRI and CT-scan)

High survivorship

JOURNEY II UK has shown excellent early survivorship[‖30,31] and when used with Smith+Nephew handheld robotics demonstrated 100% survivorship in the UK NJR[**32]

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*On dry bone models. †Compared with cUKA. ‡Compared to TKA. §Patient expectations component of KSS. ¶Assumes average length of stay for conventional TKA (4.1 days) and and cUKA (2.6 days),[20] and bed day cost (£799/€959),[21] currency conversion from GBP to Euro based on January 2021 exchange rates when data captured. ‖At 2 years. **At 1 year, n=122; Acknowledgments: We thank the patients and staff of all the hospitals in England, Wales and Northern Ireland who have contributed data to the National Joint Registry. We are grateful to the Healthcare Quality Improvement Partnership (HQIP), the NJR Steering Committee and staff at the NJR Centre for facilitating this work. The views expressed represent those of the authors and do not necessarily reflect those of the National Joint Registry Steering Committee or the Health Quality Improvement Partnership (HQIP) who do not vouch for how the information is presented.

Abbreviations: cUKA = conventional unicompartmental knee arthroplasty; KSS = Knee Society Score; OKS = Oxford Knee Score; rUKA = robotically assisted unicompartmental knee arthroplasty; TKA = total knee arthroplasty; UKA = unicompartmental knee arthroplasty; UK NJR = National Joint Registry of England, Wales, Northern Ireland, the Isle of Man and the States of Guernsey.

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