

Budget Impact Analysis of Utilization of WavelinQ Endo Arteriovenous Fistula System for Hemodialysis Patients from an Australian Hospital Perspective

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Background and Objectives:

- Patients with end-stage kidney disease (ESKD) require renal replacement therapy, often in the form of hemodialysis (HD), which requires vascular access (VA). However, VA historically has low patency rates, resulting in frequent reinterventions and significant costs.¹
- Clinical guidelines recommend using arteriovenous access (AVF or AVG) over a central venous catheter (CVC) for VA in HD patients.²
- Technological advancements such as endovascular AVF (endoAVF) could be a more cost-effective and clinically efficient approach for creating VA compared to traditional surgical AVF (sAVF).^{3,4} Evidence supports use of endoAVF utilizing the WavelinQ System in terms of patency and reduced reinterventions.⁵
- A budget impact analysis was conducted from an Australian hospital perspective to estimate the budget impact of using endoAVF with the WavelinQ system in HD patients compared to the SAVF and CVC alone.

Methods:

Modelling framework

- A budget impact model was developed for the incident and prevalent HD patients in Australia, incorporating local epidemiological and costing data. Clinical data were collected from real-world sources.
- Cost estimates were sourced from Australian medical facility, Flinders Medical Centre (FMC), for all index procedures and reinterventions (angioplasty, thrombolysis, thrombectomy, stent placement, embolisation/ligation, thrombin injection, DRIL [steal syndrome], catheter placement, catheter exchange, AVG creation, new sAVF placement, infection [inpatient and outpatient]).
- The incident and prevalent cohorts were based on FMC utilization patterns.
- Market shares of CVC and sAVF were determined for the incident and prevalent populations in the pre-WavelinQ phase.
- Considering the one-year time horizon, no discount rate was applied.
- The costing year for the analysis was 2021.
- Total costs pre-WavelinQ introduction were compared to post-WavelinQ substitution to determine the budget impact. Reintervention reduction were also estimated.
- **Table 1** presents the detailed model inputs and their data sources.

Assumptions

- The catheter exchange rate for WavelinQ and sAVF was assumed to be equivalent to the rate reported for AVFs.
- The number of CVC placements was assumed to be one for incident CVC patients and zero for prevalent CVC patients.

Table 1: Model inputs and data sources

Patient population

- The number of incident ESKD patients on HD was assumed to be 50
- The number of prevalent ESKD patients on HD was assumed to be 250

Costs

- Based on data analysed from FMC, the total procedural costs for WavelinQ, sAVF, and CVC were estimated to be AU\$16,282, AU\$9,270, and AU\$1,237, respectively in both inpatient and outpatient settings.
- The costs of reinterventions, such as angioplasty, thrombectomy, stent placement, embolization/ligation, DRIL (Steal Syndrome), AVF revision, catheter placement, new sAVF placement, and infection (inpatient), were sourced from FMC*. The costs associated with other reinterventions, such as thrombolysis, thrombin injection, catheter exchange, AVG creation, and infection (outpatient) were calculated based on a weighted average cost derived from the National Efficient Price Determination 2020-2021⁷

Reintervention rates

- Reintervention rates for WavelinQ and sAVF were based on a study that compared patients with an AVF created using WavelinQ to propensity score-matched incident and prevalent ESKD patients with sAVFs in the USRDS⁸
- Reintervention rates for CVCs, and catheter exchange rates for all procedures, were based on a study of ESKD patients from the University of Alabama at Birmingham who initiated HD access with a CVC⁹

Market shares of treatments

- The HD related VA comparators were based on the VA recommendations by the KDOQI clinical practice guideline for VA comprising AVF, AVG and CVC¹⁰
- Interviews with key opinion leaders were conducted to determine the market share of CVC and sAVF procedures for both incident and prevalent populations prior to the introduction of WavelinQ
- It was assumed that WavelinQ would capture 50% of the market share for incident HD patients and 10% for prevalent HD patients from sAVF arm

Key: AVF, arteriovenous fistula; AVG: arteriovenous graft; CVC, central venous catheter; ESKD, end-stage kidney disease; HD, hemodialysis; KDOQI, Kidney Disease Outcomes Quality Initiative; sAVF, surgical arteriovenous fistula; VA, vascular access.

*Some of the cost estimates were updated using latest values from FMC for this poster presentation

Results:

- The base case results demonstrated costs associated with WavelinQ, CVC and sAVF procedures per cohort and per patient for incident and prevalent HD patients at the FMC in Australia. Additionally, the implementation of WavelinQ resulted in reduction of reinterventions.

Cost outcomes

- **Table 2** presents a comprehensive overview of base case results of costs for incident and prevalent patients at FMC per cohort. Although WavelinQ incurred an incremental cost of AU\$1.3 million, its implementation resulted in cost savings due to reduction in reintervention rates. The potential total costs were reduced from approximately AU\$16.3 million to AU\$14.4 million, leading to potential savings of AU\$1.9 million per cohort.
- **Figure 1** illustrates the comparison of one-year costs per patient for each procedure before and after the introduction of WavelinQ. On analyzing per-patient data, it was found that while WavelinQ incurred additional costs of AU\$4,355, it still resulted in overall cost savings. The total cost per patient of AU\$54,302 during the pre-WavelinQ phase, decreased to AU\$48,042 per patient during the post-WavelinQ phase, resulting in substantial savings of AU\$6,260 per patient.

Reintervention outcomes

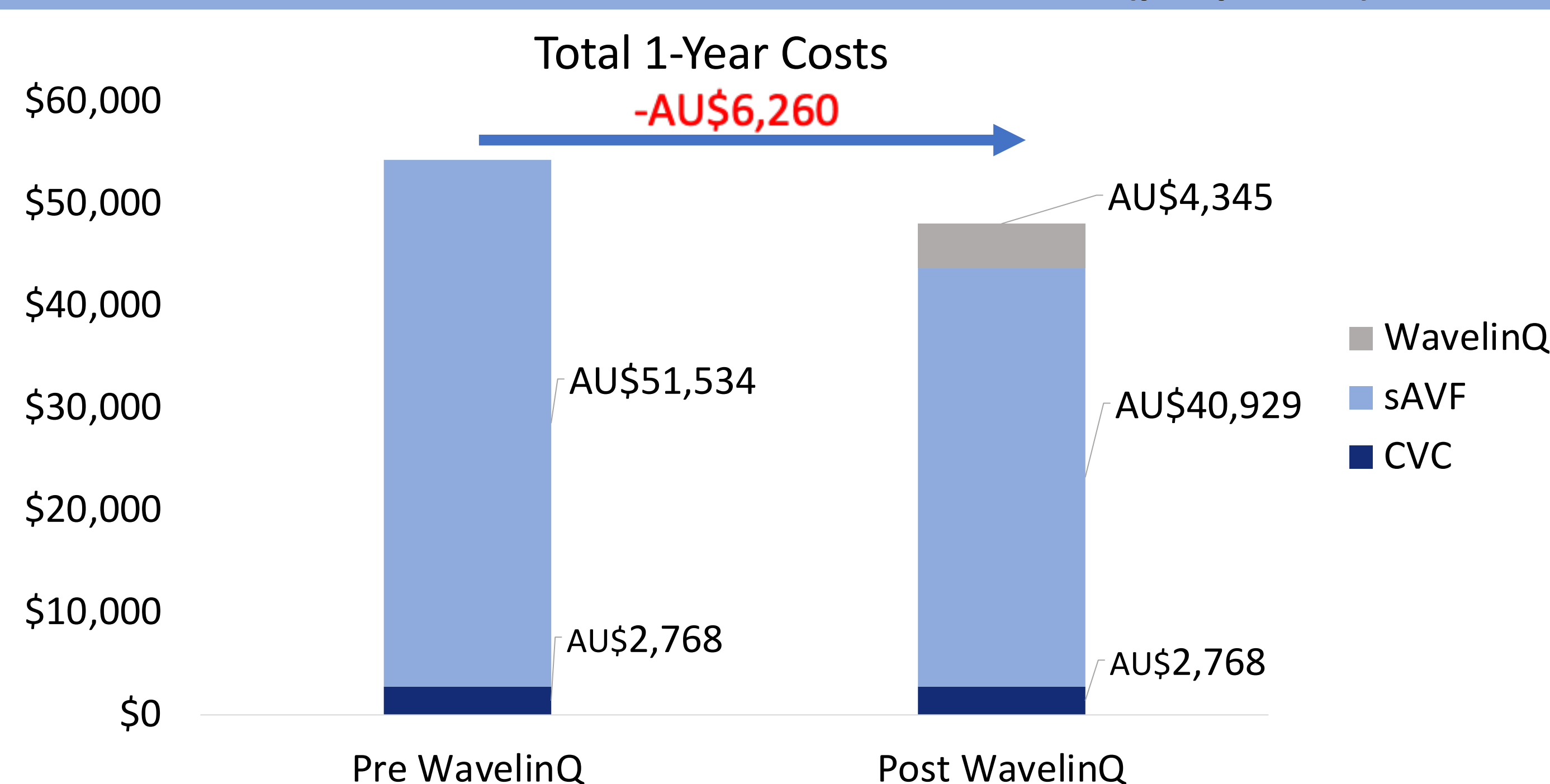
- The introduction of WavelinQ led to a significant reduction in 1-year reinterventions for each procedure in both incident and prevalent cohorts, as evidenced by the per-cohort and per-patient data. Prior to WavelinQ, the total reinterventions were 2,288 (sAVF, n=2,150; CVC, n=138). After the introduction of WavelinQ, the total reinterventions decreased to 1,965, (WavelinQ, n=62; sAVF, n=1,764; CVC, n=138). In terms of per-patient data, the overall reduction in reinterventions was 1.08.

Table 2: Base-case results

| Costs for Incident and Prevalent Patients in Australia (per cohort) | | | | |
|---|-----------------------|-----------------------|-----------------------|---------------|
| Interventions | Pre WavelinQ | Post WavelinQ | Incremental | Cost Savings |
| WavelinQ | AU\$0 | AU\$1,303,484 | AU\$1,303,484 | AU\$1,877,936 |
| sAVF | AU\$15,460,061 | AU\$12,278,641 | -AU\$3,181,420 | |
| CVC | AU\$830,535 | AU\$830,535 | AU\$0 | |
| Total | AU\$16,290,596 | AU\$14,412,660 | -AU\$1,877,936 | |

Key: CVC, central venous catheter; SAVF, surgical arteriovenous fistula.

Figure 1: Costs for Incident and Prevalent Patients in Australia (per patient)



Key: CVC, central venous catheter; SAVF, surgical arteriovenous fistula.

Conclusion:

- Our analysis provides evidence supporting the clinical benefits and cost savings associated with the endovascular catheter-based approach for creating AVF (WavelinQ) system in HD patients.
- The utilization of WavelinQ is anticipated to result in cost savings primarily attributed to the reduction in reintervention procedures. Therefore, hospitals and healthcare providers should not solely focus on the initial increase in upfront costs but also consider the potential long-term savings derived from decreased reinterventions.
- These findings have important implications for decision-makers and healthcare providers, as they suggest that this technology may represent a promising avenue for improving the efficiency of HD care. There is a need for continued research on the budget impact of different HD modalities across multiple settings.

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