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BRIEF COMMUNICATION

The Cost Differential Between Warfarin Versus Aspirin Treatment After a Fontan Procedure

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Background The use of aspirin versus warfarin for treatment of patients after a Fontan procedure remains contentious. Current preference-based models of treatment across Australia and New Zealand show variation in care that is unlikely to reflect patient differences and/or clinical risk.

Methods We combine data from the Australian and New Zealand Fontan Registry and a home INR (International Normalised Ratio) monitoring program (HINRMP) from the Royal Children's Hospital (RCH) Melbourne, to estimate the cost difference for Fontan recipients receiving aspirin versus warfarin for 2015. We adopt a societal perspective to costing which includes cost to the health system (e.g. medical consults, pathology tests) and costs to patients and carers (e.g. travel and time), but excludes costs of adverse events. Costs are presented in Australian 2015 dollars; any costs from previous years have been inflated using appropriate rates from the Australian Bureau of Statistics.

Results We find that warfarin patients face additional costs of $825 per annum, with the majority ($584 or 71%) of those borne by the patient or family. If aspirin is as clinically as effective as warfarin, Fontan recipients could be enjoying far less costly, invasive and time-consuming treatment. While achieving such clinical consensus can be difficult, economics shows us that there are large costs associated with a failure to achieve it.

Introduction

Despite more than 30 years of debate, we appear no closer to consensus on the use of aspirin versus warfarin for anticoagulation of Fontan recipients [1] who are known to be at high risk of thromboembolic events [2]. A randomised trial [3] was unable to confirm non-inferiority of either treatment due to a lack of power [2]. Further studies have reported no clinical difference between aspirin and warfarin in reducing thromboembolic events [1,4–6], however inaccuracy of warfarin control continues to limit inference [7]. There are also alternative findings that treatment with warfarin is associated with a lower risk of thromboembolic events post discharge [8]. As noted by the European Society of Cardiology, the clinical effectiveness of aspirin over warfarin is therefore still uncertain, and as a result, the model of care for anticoagulation treatment following Fontan surgery varies markedly [9]. According to the Australian and New Zealand Fontan Registry (hereafter the Registry), 85% of Fontan recipients in the state of Victoria receive warfarin, while in New South Wales, an adjoining state, the proportion is 21% [10]. Such variation is not easily explained by differences in patient presentation or risk, chance or data collection methods [11] but appears to be dependent on surgeon and cardiologist preference.

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There are costs to this uncertainty of treatment. Aspirin is inexpensive, can be purchased over-the-counter, and is easily administered at a fixed dose in the patient's home. Warfarin requires a prescription and regular monitoring usually by visits to a clinic or general practitioner, which is inconvenient, costly and impinges on patient quality of life. If aspirin is clinically as effective as warfarin, Fontan recipients could be enjoying less costly, invasive and time-consuming treatment. If warfarin provides some clinical benefit or additional safety, then aspirin-takers could face some irreversible clinical costs by not using warfarin. Weighing these costs against each other, as clinicians implicitly do in making treatment decisions, is known in health economics as options theory analysis [12]. To the best of our knowledge, there has been no cost comparison of aspirin versus warfarin for Fontan recipients to help to inform such analysis. This study aimed to estimate the 2015 cost difference for a Fontan recipient on warfarin versus aspirin, and to calculate the cost implications of the choice over time in the Australian setting.

Methods

This study combines data from the Registry and a home INR (International Normalised Ratio) monitoring program (HINRMP) from the Royal Children's Hospital (RCH), Melbourne [13]. A full description of the characteristics of

Table 1 Costing inputs.

Parameter	Value	Source
Costs associated with treatment and monitoring		
Warfarin- dose (50 tablets)	$13.03	Pharmaceutical Benefits Schedule, January 2015 (Items 2844Q and 8202Q)*
Aspirin- dose 100 mg (121 tablets)	$8.21	Dose is average from HINRMP database Royal Children's Hospital Melbourne [13]
GP monitoring		
−consult	$16.95	Medical Benefits Schedule, January 2015 Level A consultation (Item
−pathology	$13.70	number 3) and INR test (Item number 65120)**
−travel	$4.56	Average 6 km per consult (Jowett et al. 2008 [16], 76c per kilometre (Australian Tax Office 2014)***
−patient time	$33.45	Average time and gross opportunity cost of time from Gaw [13] inflated
−subtotal	$68.66	to 2015 dollars
Hospital clinic monitoring		
−consults	$3.09	Medical Benefits Schedule, January 2015 Level B consultation (Item
−pathology	$13.70	number 23) once per year and INR test (Item number 65120)**
−travel	$31.66	Average 29 km per consult according to expert survey, 76c per kilometre (Australian Tax Office 2014)**, plus an additional $10 for parking and freeway tolls
−patient time	$34.47	Average time and gross opportunity cost of time from Gaw [13], inflated
−subtotal	$82.92	to 2015 dollars
Home monitoring		
−consult	$3.77	Consultation cost from Gaw [13] inflated to 2015
−device (cost/test)	$3.48	CoagChek XS $699, 10 year life span, 20 tests per year
−test strips (cost/strip)	$5.66	
−training	$1.17	CoagChek XS $150 for 24 strips
−other consumables	$3.26	Based on Gaw [13] estimates, inflated to 2015 dollars
−subtotal	$17.33	
Key assumptions		
Proportion testing at		
−home	43%	Weighted average from each state according to numbers receiving warfarin. Sources included HINRMP database Royal Children's Hospital Melbourne [13], New Zealand dataset and expert opinion
−hospital or pathology clinic	47%	
−general practice	10%	
Cost of potential adverse events		Excluded from the analysis

*http://www.pbs.gov.au/pbs/home.
**http://www9.health.gov.au/mbs/search.cfm.
***https://www.ato.gov.au/Business/Income-and-deductions-for-business/Business-travel-expenses/Motor-vehicle-expenses/Calculating-your-deduction/Cents-per-kilometre/.

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