REAL-WORLD ECONOMIC EVALUATION TO SUPPORT INVESTMENT DECISIONS

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PRESENTATION OUTLINE

- Introduction to economic evaluation
 - Definition/roles
 - Analytical approaches
- Case study: Cost-effectiveness analysis of two different PICCs at The Ottawa Hospital (TOH)

ECONOMIC EVALUATION

- The comparative analysis of alternative courses of action in terms of both costs and consequences (Drummond et al., 2005)
- Its ultimate goal is: EFFICIENCY
 - maximisation of benefits given available resources
- Its role is to provide rigorous data to inform and improve the health care decision-making process





ECONOMIC EVALUATIONS IN DRUG DEVELOPMENT AND MARKET ACCESS



Source: Cai J. Real World Evidence & Market Access Summit 2015



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ECONOMIC EVALUATION IN PROGRAM EVALUATION CYCLE



ECONOMIC EVALUATION RESULTS

Incremental cost-effectiveness ratio (ICER)

$$ICER = \frac{Cost_A - Cost_B}{Effect_A - Effect_B}$$

"extra costs needed to pay to increase an additional unit of benefit or to avoid an additional unit of adverse outcome"

- Level of confidence on the results (uncertainty)
 - 95% Cls
 - Sensitivity analysis



ECONOMIC EVALUATION APPROACHES





REAL-WORLD DATA

"Data used for decision-making that are not collected in conventional RCTs"- ISPOR Task Force, 2007

- Examples
 - Ongoing or completed pragmatic RCTs
 - Provincial health administrative databases: claim data, diagnostic/lab data, medication use
 - Hospital records and administrative and clinical databases
 - Patient registries: Ontario Cancer Registry, BORN
 - Surveys: CCHS, OHS
 - Medical device/mobile apps/wearables



REAL-WORLD ECONOMIC EVALUATION TO SUPPORT INVESTMENT DECISIONS A CASE STUDY

Is BioFlo® a cost-effective alternative to PowerPICC Solo® at TOH?

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BACKGROUND

- A Peripherally Inserted Central Catheter (PICC) is a soft flexible tube inserted into the arm.
- It provides safe central venous access for patients who require a wide range of therapies: antibiotics, chemotherapy, total parental nutrition, and blood transfusion.
- The use of PICCs has gained popularity due to the ease of insertion and perceived safety.
- PICCs purchasing decisions are often based on catheter cost alone without consideration of the incidence and cost of complications such as occlusions (blood clots).









BACKGROUND

 At TOH, BioFlo® (BioFP) and PowerPICC Solo® (PPS) were the 2 catheters inserted.



This project compared costs and outcomes of the BioFP and the PPS from TOH's perspective.



METHODS

- Project team members:
 - Advanced Practice Nurse (*McDiarmid*), Clinician (*Dr. Carrier*), Health Economists (*Thavorn and Van Katwyk*), IQ@TOH staff (*Jennings*)
- Cost-effectiveness analysis:

 $\frac{Cost_{BioFP} - Cost_{PPS}}{Outcomes_{BioFP} - Outcomes_{PPS}}$

- Outcomes:
 - Number of pts. with PICC related deep vein thrombosis and/or catheter occlusion
- All PICCs inserted in adult patients at TOH between May 2012 and March 2015.



METHODS

- Comparators
 - BioFP: inserted between Jan 2013 to Dec 2014
 - PPS: inserted between May 2012 to Jan 2013
- Data sources
 - Hospital costs: TOH Finance Department and published literature
 - **Outcomes**: Vascular access database established as part of the Central Vascular Access led by an advanced practice nurse
- Multivariate regression analyses: controlling for patient age, sex, dwell time, and diagnosis.
- The statistical uncertainty was characterized by estimating 95% CIs using a bootstrapping method.



RESULTS: DESCRIPTIVE STATISTICS

The characteristic of patients receiving BioFlo and PPS are statistically comparable.

Variable	BioFP PPS		P-Value
	(N=2,504)	(N=656)	
Age, mean (SD)	60.3 (14.1)	60.8 (15.9)	0.417
Female, %	50.2	49.1	0.626
Insertion location			
Inpatient, %	33.5	32.7	0.675
Insertion arm			
Right, %	84.0	84.0	0.970
Insertion vein			
Basilic	78.0	81.2	0.067
PICC tip location			
Cavoatrial junction, %	43.4	40.6	0.183
Diagnosis, %			
Cancer/heme/malignancies	34.9	34.9	0.971
Infection	52.0	48.3	0.095
Other	13.1	16.7	<0.050

RESULTS: UNADJUSTED COSTS AND NUMBER OF COMPLICATIONS

Variable	BioFP (N=2,504)	PPS (N=656)	Mean difference (95% CI)
Total hospital costs, mean (SD)	\$237 (\$238)	\$281(\$305)	\$43.66 (\$18.52, \$68.80)
 PICC unit cost, mean (SD) 	\$176 (\$12)	\$176 (\$5)	\$0.04 (-\$0.67, \$0.59)
 PICC insertion and management cost, mean (SD) 	\$28 (\$85)	\$52 (\$145)	\$24.05 (\$12.31, \$35.79)
 DVT cost per case, mean (SD) 	\$33 (\$211)	\$53 (\$264)	\$19.61 (\$2.21, \$41.43)
Number of Pts. experiencing any complications, mean (SD)	0.42 (1.20)	0.71 (1.78)	0.28 (0.13, 0.43)
 Number of Pts. experiencing occlusions, mean (SD) 	0.40 (1.17)	0.67 (1.86)	0.27 (0.12, 0.42)
 Number of Pts. experiencing DVT, mean (SD) 	0.02 (0.15)	0.04 (0.19)	0.01 (0.00, 0.03)



IS BIOFP A COST-EFFECTIVE ALTERATIVE TO PPS?

Variable	BioFP (N=2,504)	PPS (N=656)	Mean difference (95% CI)	
\triangle Costs, \$	-40.50 (-16.84, -62.72)			
∆ Number of Pts. with PICC-related complications	-0.27 (-0.14, -0.40)			
$\Delta C / \Delta E$	BioFP is dominant			
	(lower cost with fewer complications)			



IS THE BIOFP A COST-EFFECTIVE ALTERATIVE TO PPS?



IS THERE ANY UNCERTAINTY AROUND THE RESULT?



STUDY CONCLUSION

- BioFP offers good value for money to TOH.
- Key limitation:
 - Routinely collected data > limited variables available for the adjustment of confounding factors
- Study findings were used to inform the purchasing decision of PICCs at TOH.



TAKE HOME MESSAGES

- Real-world economic evaluation is a useful framework
 - Resource allocation dilemma: trade-off between resource required and outcome gained
 - Program evaluation: costs and outcomes data are available
 - A single clinic -> a hospital -> a health care system
- Collaborative activities with various stakeholders
 - Accomplish tasks in a timely manner
 - Promote the systematic application of the findings in practice



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