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Economic Burden of Adverse Drug Reactions and Potential for Pharmacogenomic Testing in Singaporean Adults

INTRODUCTION



Adverse drug reactions (ADRs) contribute to increased hospital admissions¹

Singapore Healthcare

Management 2018

- ADR survey in 1000 random adults admitted non-electively to SGH²
 - 12.4% of patients had at least 1 ADR at admission
 - 8.1% of admissions were caused by an ADR
- Pre-emptive pharmacogenetic (PGx) testing can potentially reduce ADRs and its associated costs

OBJECTIVES

- To quantify the economic burden of ADRs
- To estimate the breakeven cost of pre-emptive PGx testing in Singapore

- Itemized cost for 1000 random non-elective adult hospitalizations in SGH
- Economic burden
 - Total cost of hospitalizations caused by ADRs
 - Incremental costs
 - Cost of admissions with ADRs vs. that of propensity scorematched controls
 - Wilcoxon sign rank test
- Pre-emptive PGx testing breakeven cost Avoidable hospitalization costs due to drugs with a PGx association
 - Estimated number of people taking those drugs
 - Amounts extrapolated to entire Singapore population over a year

RESULTS and CONCLUSIONS

Total Cost

- 81 admissions caused by ADRs \rightarrow **S\$788, 298**
- Bleeding and/or elevated International

Table 1	Total cost of a	otal cost of admissions cause by top 5 ADR types						
ADR type	N	Median (ra	Р					
		Yes	No					
Gastrointestinal	18	\$2760 (\$981 - \$112600)	\$4179 (\$817 - \$55710)	0.385				
Bleeding/elevated INR	15	\$13690 (\$1953 - \$26710)	\$3111 (\$817 - \$112600)	6.58 x 10 ⁻³				
Electrolyte abnormalities	8	\$2289 (\$1082 - \$8331)	\$4179 (\$817 - \$112600)	0.157				
Infection/sepsis	6	\$6563 (\$2256 - \$55710)	\$3902 (\$817 - \$112600)	0.422				
Hypotension	6	\$2960 (\$1082 - \$6054)	\$4228 (\$817 - \$112600)	0.245				

Normalized Ratio (INR) cost more than other types of ADRs (Table 1)

Incremental Cost

- Total incremental cost was not significantly higher
- Costs for laboratory investigations were significantly higher in admissions with ADRs (Table 2)

Table 2 **Incremental costs of ADRs**

Cost type	Admissions caused by ADRs	Admissions with but not caused by ADRs		
	Median of differences (95%CI), S\$	р	Median of differences (95%CI), S\$	р
Total	\$477 (-\$685 - \$3455)	0.243	-\$12 (-\$2077- \$5893)	0.561
Drugs	\$66 (-\$23- \$203)	0.100	-\$11 (-\$142 - \$164)	0.941
Laboratory investigations	\$259 (\$124- \$901)	0.005	\$391 (\$137 - \$1410)	0.014
Other investigations	\$28 (-\$199- \$521)	0.412	\$293 (-\$77- \$896)	0.118
Treatments and procedures	\$36 (-\$135- \$484)	0.329	\$86 (-\$205 - \$732)	0.265
Ward	\$106 (-\$65 - \$1159)	0.104	\$79 (-\$533 - \$1784)	0.455
Service and facility fees	\$0 (-\$189- \$282)	0.903	\$0 (-\$422 - \$1241)	0.874
Consumables and misc	-\$7 (-\$100- \$133)	0.912	\$10 (-\$164 - \$737)	0.747

The numbers each of cases and controls for admissions caused by ADRs and admissions with but not caused by ADRs were 76 and 37, respectively.

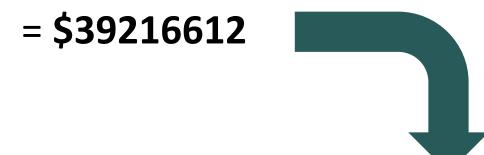
Pre-emptive PGx breakeven cost

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Within ADR survey¹

	Drugs in drug-ADR pairs with PGx association	Total cost	Efficacy of PGx testing in reducing the ADR	Potential savings	x no.	of adult admissions in 2016 (467936)			
Avoidable	Warfarin	\$119750	31.5% ³⁻⁶	\$37721	x proportion non-elective (63%) ²			= \$39216612	
	Clopidogrel	\$53374	38.4% ^{7,8}	\$20496					
	Chemotherapeutics	\$87447	80.8% ⁹	\$70657					
ation costs ugs with a	Neuropsychiatric	\$8800	47.2% ¹⁰	\$4154	Drug	Indications	Est no. of patients		
ciation	drugs				Warfarin	Venous thromboembolism ¹¹	4099		
umber of						Atrial fibrillation ¹²	22692		
those						Heart valve replacement due to aortic stenosis ¹³	81		
drugs					Clopidogrel	Myocardial infarction ¹⁴	15331		
						Ischemic stroke ¹⁵	8583	247988	
					Chemotherapeutics	Cancer ¹⁶	21176		
					Neuropsychiatric	Use of anti-depressants & benzodiazepines ¹⁷	95149		
				٢	drugs	Bipolar disorder ¹⁸	28545		
						Obsessive compulsive behavior ¹⁹	52332		

Nationwide





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