

Results of the liberalisation of Medisave for a population-based diabetes management programme in Singapore

Woan Shin TAN¹, Yew Yoong DING^{1, 2}, Christine WU³, Bee Hoon HENG¹

¹ Health Services and Outcomes Research Department, National Healthcare Group, Singapore

² Department of Geriatric Medicine, Tan Tock Seng Hospital, Singapore

³ Medical Affairs, Alexandra Hospital, Singapore

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Literature

- Improvements in processes of care are associated with diabetes management programmes
- Greater compliance with processes of care not consistently linked to improvements in intermediate outcomes such as blood lipid levels
- Several studies reported an improvement in clinical outcomes whereas others found little impact
- Systematic reviews have not shown conclusively that diabetes management programmes lower healthcare costs

Medisave for CDMP

- Medisave for Chronic Disease Management Programme was launched in Oct 2006 to
 - Improve affordability of outpatient treatment
 - Promote evidence-based care protocol
 - Reduce downstream complications and hospitalisations
 - Covers 15 chronic conditions
 - Diabetes, hypertension, hyperlipidaemia, stroke, asthma, COPD, schizophrenia, major depression, bipolar disorder, dementia, osteoarthritis, benign prostatic hyperplasia, anxiety, Parkinson's disease and nephrosis/nephritis

Medisave for CDMP



- Withdrawal limit: \$300/acct
- Deductible: \$30/ bill
- Co-payment: 15% / bill
- Administrative fee: \$3.50 / claim

- Blood glucose (X2)
- Blood pressure (X2)
- Body Weight (x2)
- Blood Cholesterol (x1)
- Foot screening (x1)
- Eye screening (x1)
- Nephropathy screening (x1)
- Smoking cessation

- HbA1C control
- Blood pressure control
- LDL-C control

Study objectives

- To assess whether CDMP participants compared to non-participants have
 1. better compliance to the recommended processes of care
 2. lower risk of all-cause and diabetes-related hospitalization, and
 3. lower total all-cause annual healthcare costs and diabetes-related inpatient costs
- Sub-groups:
 - No complications and acceptable glycaemic control ($\text{HbA1c} < 8\%$)
 - No complications and poor glycaemic control ($\text{HbA1c} \geq 8\%$)
 - DM complications and acceptable glycaemic control
 - DM complications and poor glycaemic control

Methodology

- Pre-test/Post-test design with comparator group
- Adult patients diagnosed with T2DM
 - Include: ≥ 1 diabetes-related polyclinic consultation in 2006, 2007
 - Exclude: COPD, asthma, schizophrenia, depression diagnoses
- Definition:
 - Enrollees: Used Medisave to pay for polyclinic consultations in all 3 years (2007, 2008, 2009)
 - Non-Enrollees: Did not use Medisave to pay for polyclinic consultations in any of the 3 years (2007, 2008, 2009)

Analytic approach

- Propensity score to adjust for selection bias:
 - Predicted probability of membership based on observed variables
- Outcomes evaluation:
 - Descriptive analysis
 - General estimating equations - correlation of repeated measurement
 - Difference-in-Difference estimator - differences in outcomes between groups at baseline

Study population

Inclusion criteria

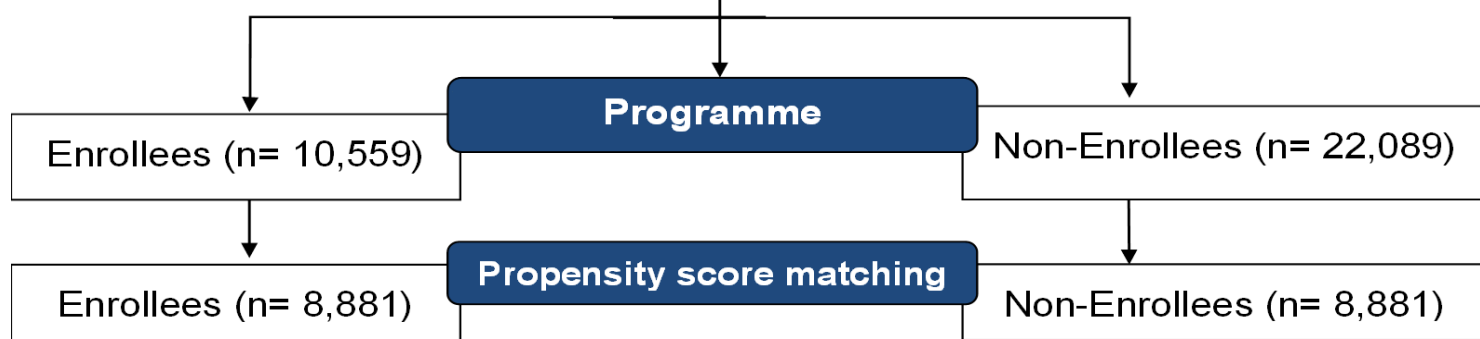
- T2DM diagnosis
- ≥ 1 consultation visit for T2DM at a NHG primary care clinic for T2DM in 2006 and 2007

Assessed for eligibility
(n=59,632)

Excluded (n= 18,073)

- Non-resident (n=689)
- < 21 years old (n=7)
- < 1 NHG primary care clinic visit in 2006, 2007 (n=12,224)
- Diagnosis of COPD, asthma, schizophrenia, major depression (n= 5,046)
- Missing data (n=107)

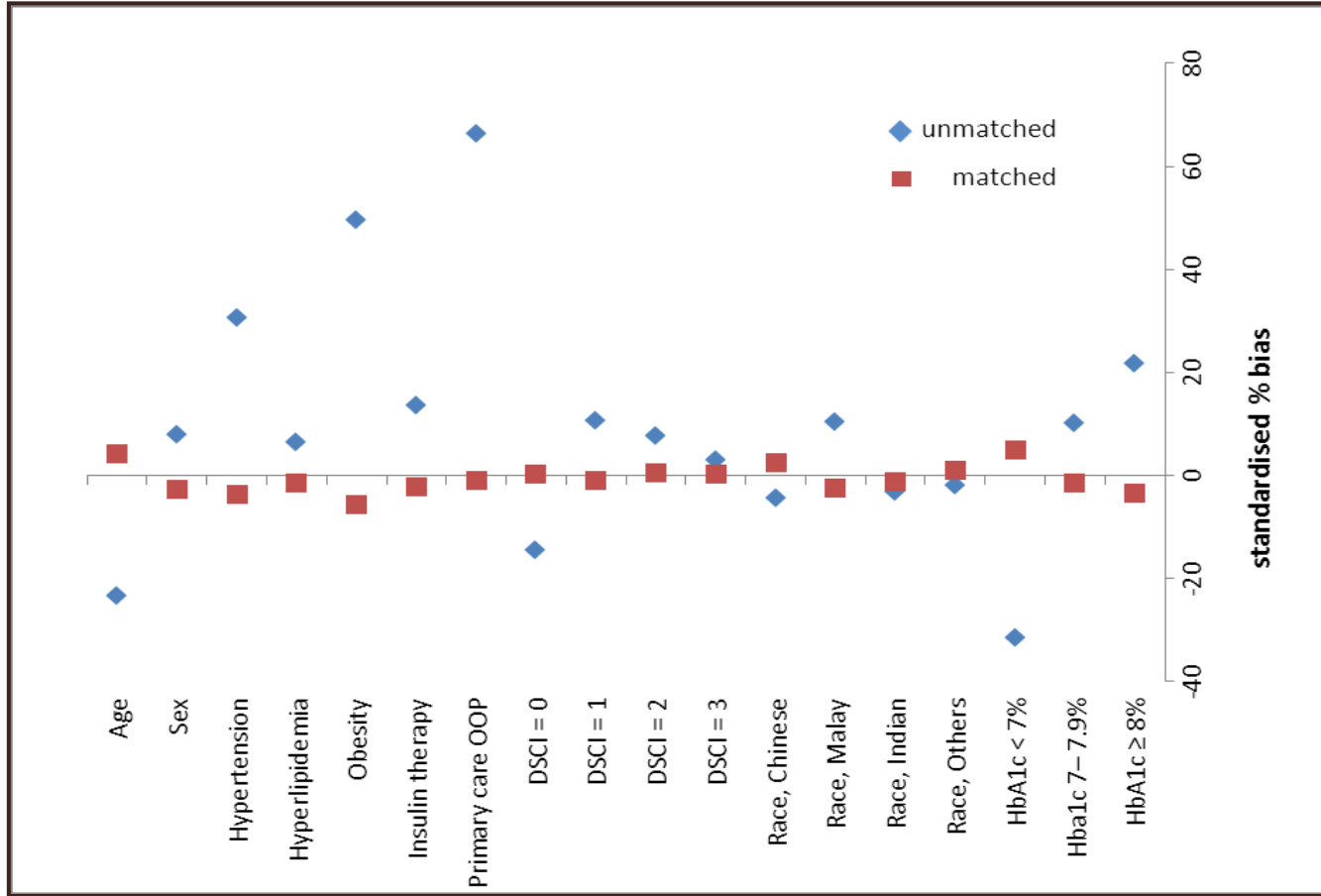
Eligible (n= 41,559)



National Healthcare Group (NHG) Chronic Disease Management System (CDMS)

- Data years: 2006 to 2009
- Data variables: Demographic characteristics, co-morbid conditions, diabetes-complications, care components received, clinical readings, health resource use and cost

Improved covariate balance



Compliance to care components

	HbA1c test	LDL-C test	Nephropathy screening	BP test	Weight	Retinal exam	Foot exam
2006							
Participants	95.3	87.4	87.6	13.4	8.8	50.4	66.0
Non-Participants	94.6	88.7	88.1	12.6	8.8	52.8	69.5
P Value*	0.028	0.007	0.358	0.108	0.979	0.002	<0.001
2007							
Participants	98.2	90.8	89.8	68.8	60.3	46.5	67.0
Non-Participants	94.9	88.4	87.9	51.3	46.5	44.8	63.3
P Value*	<0.001	<0.001	<0.001	<0.001	<0.001	0.023	<0.001
2008							
Participants	98.1	90.4	89.9	67.4	59.2	45.5	67.5
Non-Participants	89.3	84.3	84.2	57.5	52.2	41.3	60.2
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2009							
Participants	96.9	89.0	90.2	69.4	50.3	40.0	61.2
Non-Participants	84.7	79.5	81.5	60.2	45.6	36.1	53.0
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* Chi-square test.

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Unadjusted Results

	All-Cause Hospitalization Rate, %			All-Cause Total Healthcare Cost (US\$), mean†		
	Participants	Non-Participants	Difference	Participants	Non-Participants	Difference
2006	4.2	4.1	0.1	620	648	-28
2007	3.7	5.0	-1.3	622	831	-209
2008	4.7	5.6	-0.9	744	987	-243
2009	5.6	5.9	-0.3	1,007	1,051	-44

	Diabetes-related Hospitalization Rate, %			Diabetes-related Inpatient Healthcare Cost (US\$), mean†		
	Participants	Non-Participants	Difference	Participants	Non-Participants	Difference
2006	1.9	1.7	0.2	75	57	19
2007	1.4	2.6	-1.2	41	132	-91
2008	1.8	2.8	-1.0	53	164	-111
2009	2.6	3.0	-0.4	152	164	-11

† Mean total healthcare cost have been discounted to 2006 prices using the Consumer Price Index.

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Policy Effect Size for Medisave for CDMP

	All-Cause Hospitalization†			Diabetes-Related Hospitalization†		
	Odds Ratio	95% C.I.		Odds Ratio	95% C.I.	
Year 2007	0.76***	0.65	0.88	0.46***	0.34	0.63
Year 2008	0.79**	0.68	0.92	0.54***	0.40	0.73
Year 2009	0.91	0.79	1.05	0.76	0.57	1.01
	All-Cause Total Healthcare Cost			Diabetes-related Inpatient Cost		
	Incident Cost Ratio	95% C.I.		Incident Cost Ratio	95% C.I.	
Year 2007	- 0.15***	- 0.24	- 0.06	-1.06**	-1.73	-0.39
Year 2008	- 0.14**	- 0.24	- 0.04	-1.28***	-1.88	-0.69
Year 2009	0.03	- 0.08	0.15	-0.55	-1.13	0.03

* p<0.05; ** p<0.01; *** p<0.001

Adjusted for: age, sex, ethnic group, hypertension, hyperlipidemia, obesity, Diabetes Complications Severity Index, glycemic control status, insulin therapy and time trend.

† Generalized Estimating Equation with the logit link function, binomial distribution, and unstructured covariance structure; odds ratio greater than 1 indicates higher odds of hospitalization.

‡ Generalized Estimating Equation with the log link function, gamma distribution and unstructured covariance structure; positive coefficient indicates higher cost and negative coefficient indicates lower cost.

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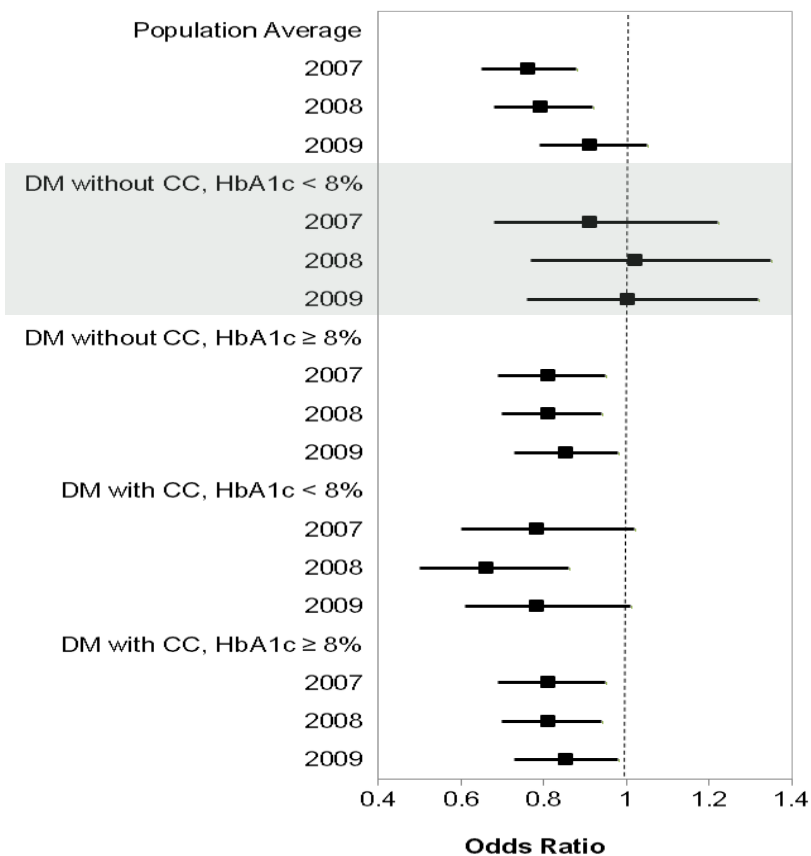
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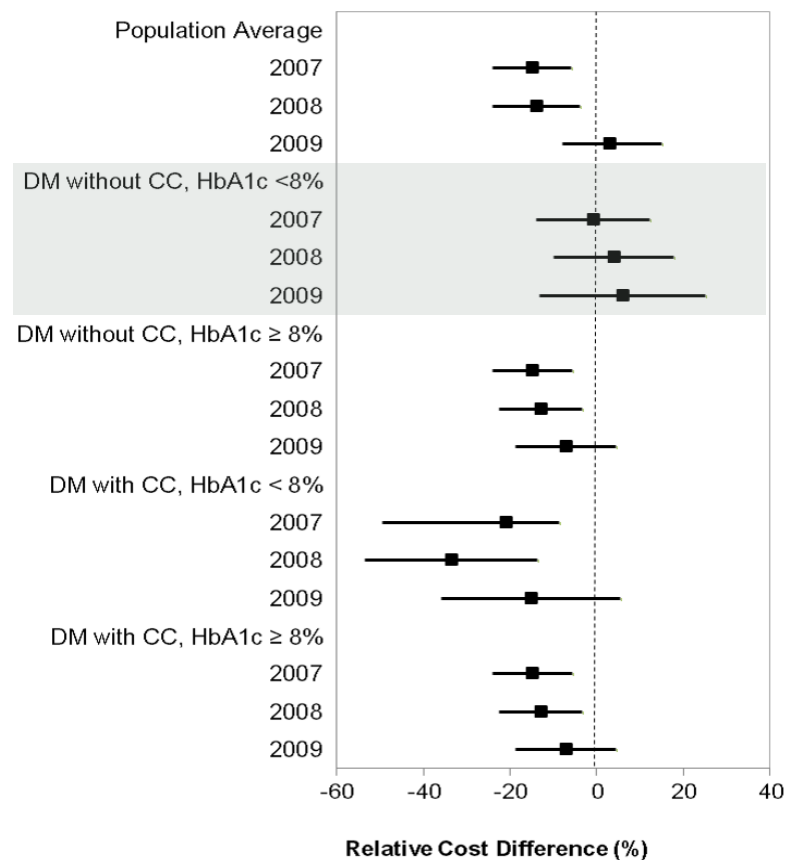
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No benefit for well-controlled patients

Odds of All-Cause Hospitalisation



Annual All-Cause Total Healthcare Cost



DM: Type 2 Diabetes Mellitus; CC: Complications

†Analyses were carried out for the following numbers of participants and non-participants: DM without CC, HbA1c < 8% (4,320 versus 4,274); DM without CC, HbA1c ≥ 8% (1,900 versus 1,935); DM with CC, HbA1c < 8% (1,920 versus 1,833); and DM with CC, HbA1c ≥ 8% (741 versus 839)

‡ Generalized Estimating Equation with the log link function, gamma distribution and unstructured covariance structure. The following variables, were adjusted for in the model: age, sex, race, hypertension, hyperlipidemia, insulin use, and time trend.

Summary

- Extension of Medisave for outpatient treatment was associated with an improvement in compliance with processes of diabetes care
- Initial reductions in hospitalisation risk and, total healthcare cost were difficult to sustain
- Cumulative reduction in healthcare cost for programme patients over a three-year period
- No significant impact on participants with well-controlled diabetes at baseline

Limitations

- Open system where patient population is dynamic
- Utilisation and cost data were collected only for organisations subscribing to the diabetes registry
- Results of the study might not be generalisable to 8.8% of Medisave for CDMP patients who are being seen by solo general practitioners

Thank you.

woan_shin_tan@nhg.com.sg

