



Integrated Diabetes Care Programme (IDCP) Improving Inpatient Diabetes Care in TTSH

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IMPETUS FOR CHANGE

The national burden of Diabetes Mellitus (DM) and its complications is unacceptably high. Diabetes is the 8th most common condition of hospitalisation in Singapore. In 2019, **33.3%** of patients admitted to TTSH have DM.

Admission is an important opportunity to influence the care of patients with DM.

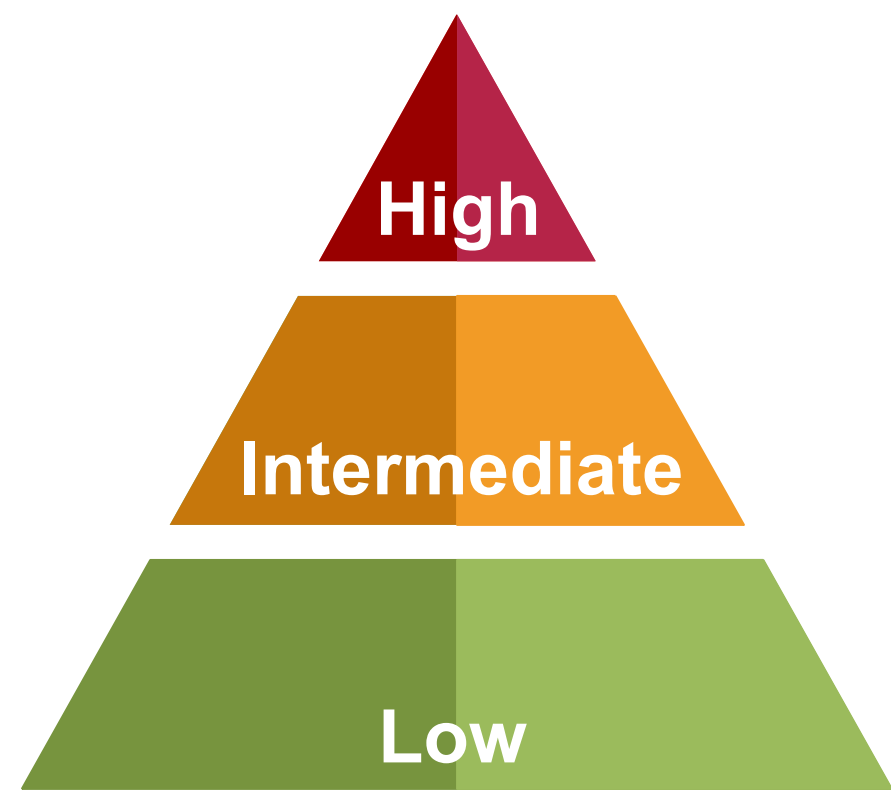
PROJECT GOALS

Under IDCP, a risk stratification-based DM management programme was conceptualised and developed to reduce complication rates and improve the quality of patient care, safety and long-term outcomes for inpatients with DM.

IMPLEMENTATION APPROACH

- An IT system named **System for Proactive Assessment of Risk (SPARK)** was created to identify and stratify DM patients into high, intermediate and low-risk categories using data from various hospital database systems based on a pre-set algorithm.
- The up-skilling of physician extenders allowed for provision of clinically non-inferior care to a larger number of patients at a lower cost.

A. PATIENT RISK STRATIFICATION and CARE TEAM MANAGEMENT



Patient Risk Categorisation	Patients under Division of Surgery (From Dec 2018)	Patients under DOM & DICC (From May 2022)
Diabetic Emergencies (High Risk)	IDCP Team	Cared for by primary team, ward pharmacist and ward nurse
Poor Diabetes Control (Intermediate Risk)	IDCP Pharmacist under supervision of IDCP Team	Cared for by primary team, ward pharmacist and ward nurse
Acceptable Diabetes Control (Low Risk)	Cared for by primary team, ward pharmacist and ward nurse	Cared for by primary team, ward pharmacist and ward nurse

B. DEVELOPMENT & IMPLEMENTATION OF IDCP

- MOH approved 5 years **HSDP funding for IDCP and SMM** approved the budget in 2017.

2017

Mar

- A multi-disciplinary team was formed as the **project champions**.
- Training of IDCP pharmacists was initiated to review patients and optimize DM medications based on clinical guidelines and institution based protocols, under the supervision of Endocrinology consultant-led team.

2018

Jun

- Rule engine** was designed upon confirmation for rule engine algorithm consisting of 11 High risk rules, 8 Intermediate risk rules and 1 Low risk rule.

Aug

Sep - Nov

- Pilot new teamlet IDCP workflows** for patients under intermediate risk at 8 inpatient wards.

Dec

- Successful **roll out and implementation to all wards under Division of Surgery**.

2022

May

- Successful **roll out and implementation** to Division of Medicine and Division of Integrative & Community Care.

C. CLINICAL OUTCOMES

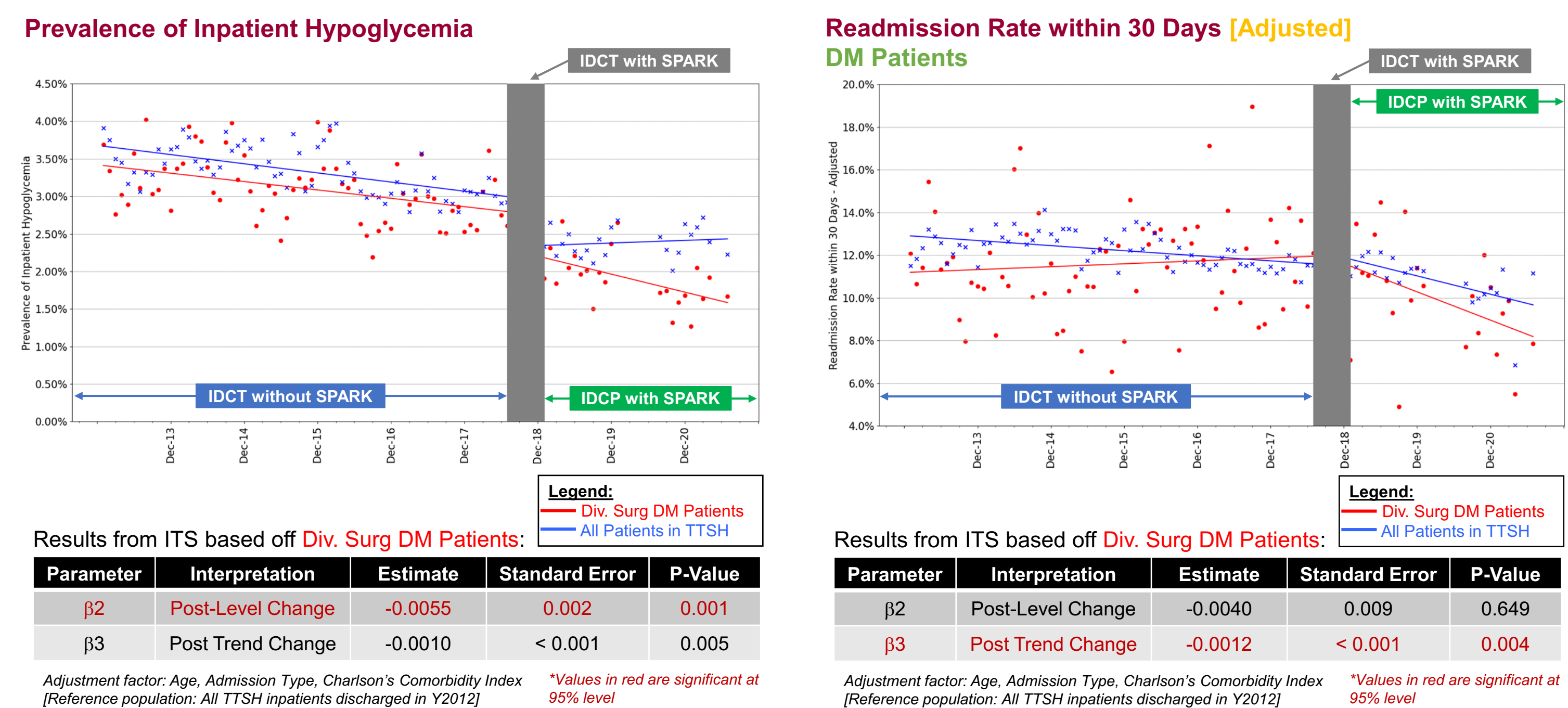
With IDCP implementation, coupled with other initiatives to improve inpatient DM care, there was a 31% reduction observed in inpatient hypoglycemia and a 22% reduction in the 30-day readmission rates (2013-2015 baseline vs. 2021) without any significant increase in length of stay (Table 1). An interrupted time series analysis, showing that the post-trend change effect of the IDCP intervention was greater than other underlying hospital wide trends (Figure 1).

Table 1: Summary of Key Hospital-Wide DM Indicators

S/N	Indicator	Baseline CY13-15	CY16	CY17	CY18	CY19	CY20	CY21	% Reduction Between Baseline And CY21
1	Prevalence of inpatient hypoglycaemia (%)	3.44	3.24	3.00	2.84	2.31	2.30	2.37	31.11%↓
2	Mean patient-day glucose (mmol/L)	8.70	8.50	8.61	8.60	8.77	8.80	8.65	0.58%↓
3	Average Length of stay (ALOS) for discharged DM inpatients (Adjusted ⁵) (days)	8.04	8.09	7.75	7.90	7.50	7.77	7.90	1.74%↓
4	All-cause readmissions within 30 days to TTSH for DM inpatients (Adjusted ⁵) (%)	13.60	13.95	13.05	12.70	12.25	10.75	10.65	21.69%↓

⁵Adjustment factors: Age, Admission Type, Charlson Comorbidity Index [Reference population: All TTSH inpatients discharged in Y2012]. Risk adjustment was performed on ALOS to allow comparisons between discharged DM inpatients and all discharged inpatients, using the direct standardization method to control for age, admission type and the Charlson Comorbidity Index of the inpatient. This produces adjusted ALOS for discharged DM patients and all patients, which assumes that the two groups being compared have the same distribution of age, admission type and Charlson Comorbidity Index as that of all patients discharged from TTSH in Year 2012.

Figure 1: Interrupted Time Series Analysis



D. ECONOMIC OUTCOMES AND HEALTHCARE IMPACT

Increased manpower resource efficiency:

- Using SPARK to generate worklist daily allowed 2300 unique patients to be reviewed in 2022, a 6-fold increase compared to 360 when cases were being screened manually.

Cost effectiveness:

- Cost analysis done by NHG Finance with NHG HSOR showed that the estimated cost avoidance in TTSH per year was \$1,235,549 through reduction in readmissions. This was based on 110 avoided readmissions per year over 5 years between FY16 to FY20 at \$11,249 per admission.

Upskilling of Pharmacy and Nursing colleagues:

- Resulted in both tangible and intangible benefits to the healthcare ecosystem.
- Led to knowledge sharing within and across family groups.

NEXT STEPS

- There is ongoing collaboration with NHG institutions to expand SPARK for risk stratification of outpatients and work with primary care in order to ensure the provision of appropriate, cost-effective care for patients in the medium to long term.
- Within TTSH, there are plans to further expand the training of IDCP pharmacists and DNCs to manage high-risk DM patients, and subsequently conduct attachment training for doctors, allied health and nursing to manage DM conditions specific to individual discipline's needs.
- There are also plans to expand IDCP cluster-wide to other hospitals within NHG, including KTPH and the future Woodlands hospital