Project Title

Effectiveness of a nurse-led insulin tele-titration program on diabetes control in Primary Care

Project Lead and Members

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Organisation(s) Involved

National University Polyclinics

Healthcare Family Group Involved in this Project

Nursing

Aims

- Enable optimisation of insulin therapy in patients with type 2 diabetes
- Reduce the risk of macro and microvascular complications of type 2 diabetes
- Reduce risk of hypoglycaemia and hyperglycaemic crisis

Background

See poster appended / below

Methods

See poster appended / below

Results

See poster appended / below

Lessons Learnt

- It would be valuable to assess diabetic control over time to determine sustainability of HbA1c improvements and if further tele consults would contribute to maintaining optimal HbA1c.
- This study is limited by a small sample size and a larger study should be conducted to run more in depth analysis on sub groups to assess the intervention's effectiveness for different patient groups.

Conclusion

See poster appended / below

Additional Information

Singapore Healthcare Management (SHM) Conference 2021 – Merit Award (Patient Experience Category)

Project Category

Care & Process Redesign, Quality Improvement, Workflow Redesign, Technology, Telehealth

Keywords

Diabetes Control, Type 2 Diabetes, Insulin Therapy, Insulin Titration, HbA1c, Insulin Tele-Titration Program

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Singapore Healthcare Management 2021

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Introduction:

The Joint Asia Diabetes Registry has estimated that around 19.4% of those diagnosed with diabetes are treated with insulin (Kong et al., 2020). Research has shown that it takes several years to reach therapeutic insulin doses and many remain on insulin doses that are inadequate for optimal diabetes control (Chun, Strong & Urquhart, 2019). Hence, it is important to consider interventions that can mitigate this issue faced by insulin users.

A review conducted by Tchero et al. (2019), demonstrated that insulin adjustments done through telephone calls are effective in optimising diabetic control when compared to a control group (Hedges'g = -0.37, $p < 0.001$). This is supported by findings from a study done by Lemelin et al. (2020). A pilot study was conducted in a polyclinic where nurses used a similar intervention for patients on insulin. In this intervention, insulin dose adjustments were made through regular phone calls in order to optimise diabetes control.

Aims:

- Enable optimisation of insulin therapy in patients with type 2 diabetes
- Reduce the risk of macro and microvascular complications of type 2 diabetes
- Reduce risk of hypoglycaemia and hyperglycaemic crisis

Methodology & Intervention:

Recruitment

Inclusion Criteria:
- Type 2 diabetes on insulin
- Patient / caregiver able to do home glucose monitoring
- Able to answer phone calls during clinic operating hours
- Completed at least 4 tele-titrations between reviews

Exclusion Criteria:
- Age < 21 or > 79 years
- Pregnant
- Frequent hypoglycemia

Teleconsult Day

Nurse calls patient / caregiver to assess for:
- Compliance to medications
- Hypoglycemia
- Home glucose readings
- Lifestyle (e.g. diet, exercise)

*Insulin dose is then adjusted according to glucose readings (see Insulin Protocol below)

Clinic Review

- HbA1c and fasting glucose review at the next clinic appointment
- Review of insulin injection technique (as needed)
- Determine if further tele-titration is indicated

The protocol for insulin dose adjustment is as follows:

Basal insulin protocol:

Pre-breakfast	Titration
>7 mmol/L	Increase 2U ON
<5 mmol/L	Decrease 2U ON

Pre-mixed (mixtard/novomix) protocol:

Pre-breakfast	Titration	Pre-dinner	Titration
>7 mmol/L	Increase 2U ON if 10pm >5 mmol/L	>7 mmol/L	Increase 2U OM if pre-lunch >5 mmol/L
<5 mmol/L	Decrease 2U ON	<5 mmol/L	Decrease 2U OM

Basal bolus protocol:

Pre-breakfast	Titration	2 hours Post meals	Titration
> 7 mmol/L	Increase basal dose 2U	>10 mmol/L	Increase pre-meal bolus dose 2U
< 5 mmol/L	Decrease basal dose 2U	< 7 mmol/L	Decrease pre-meal bolus dose 2U

In addition to the insulin titration protocol as above, nurses will consult doctors for patients on more complex insulin regimes, who have hypoglycaemia episodes or with highly variable glucose readings.

Patient Demographics:

A total of 85 patient records from January 2019 to December 2020 were reviewed and included in this study.

	N	%
Gender		
Male	45	52.9
Female	40	47.1
Age		
21-39	11	12.9
40-49	12	14.1
50-59	32	37.6
60-69	21	24.7
70-79	9	10.7

	N	%
Race		
Chinese	45	52.9
Malay	24	28.2
Indian	15	17.6
Others	1	1.3
Insulin Regime		
Basal	57	67.1
Pre-mixed	18	21.2
Basal bolus	10	11.7

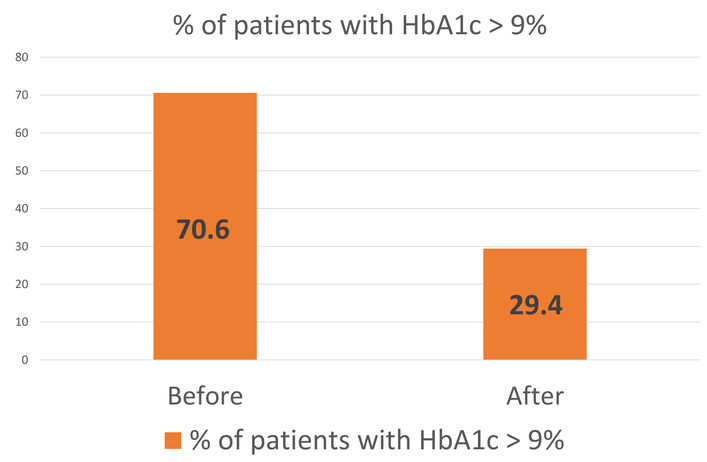
Results:

Results show that **80%** of patient's HbA1c improved post-intervention.

The mean HbA1c also showed a statistically significant improvement after the tele-titration program:

Paired samples t-test					
	Mean	Standard Deviation	t	df	Sig. (2-tailed)
Pre-HbA1c	10.1	1.7	7.04	83	$p < 0.001$
Post-HbA1c	9.2	1.7			

This study also found that number of patients with HbA1c > 9% reduced post-intervention.



Conclusion:

- Significant improvements in HbA1c reaffirmed effectiveness of nurse-led telephone consultations for optimising glycaemic control for patients on insulin.
- Following this encouraging outcome, the intervention could be rolled out to other clinics to benefit more diabetic patients

Limitations/ Recommendations:

- It would be valuable to assess diabetic control over time to determine sustainability of HbA1c improvements and if further tele-consults would contribute to maintaining optimal HbA1c.
- This study is limited by a small sample size and a larger study should be conducted to run more in-depth analysis on sub-groups to assess the intervention's effectiveness for different patient groups.

References:

1. Kong, A. P., Lew, T., Lau, E. S., Lim, L. L., Kesavadev, J., Jia, W., ... & JADE Collaborative Study Group. (2020). Real-world data reveal unmet clinical needs in insulin treatment in Asian people with type 2 diabetes: the Joint Asia Diabetes Evaluation (JADE) Register. *Diabetes, Obesity and Metabolism*, *22*(4), 669-679. doi: 10.1111/dom.13950
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