

Predicting insulin uptake among adults with type 2 diabetes in primary care: Stepping Up study

Holmes-Truscott E^{1,2}, Furler J³, Blackberry I^{3,4}, O'Neal DN⁵, Speight J^{1,2,6}

¹The Australian Centre for Behavioural Research in Diabetes, Diabetes Victoria, MELBOURNE, Australia; ²School of Psychology, Deakin University, GEELONG, Australia; ³John Richards Initiative, Australian Institute of Primary Care and Ageing, La Trobe University, WODONGA, Australia; ⁴Department of Medicine, St Vincent's Hospital, University of Melbourne, FITZROY, Australia; ⁵AHP Research, HORNBURCH, United Kingdom

Background

- Hypothetical willingness to begin insulin therapy¹ is a single-item measure typically used in research as a proxy for insulin uptake/refusal among people with type 2 diabetes (T2D)
- However, the validity of this measure in predicting actual insulin uptake has not been assessed
- Further, few studies have comprehensively examined the demographic, clinical and psychosocial predictors of insulin uptake

Aims

- Our aim was to explore predictors of insulin uptake among adults with T2D who participated in the 12-month Stepping Up randomised controlled trial (RCT)

Method

Study Design

- A two-armed cluster RCT tested the 'Stepping Up' model versus usual care in 74 general practices across the state of Victoria, Australia²
- The model was designed to increase timely evidence-based insulin initiation within primary care, through:
 - General Practitioner & Practice Nurse team education
 - face-to-face, telephone, email contact with the study diabetes nurse educator to support insulin initiation and management

Data Collected

- Dependent variable: insulin use at follow-up (12 mths)
- Demographic & clinical characteristics at baseline: e.g. socioeconomic status, HbA1c, co-morbidities
- Depressive symptoms: PHQ-9³
- Diabetes-related distress: PAID⁴
- Hypothetical willingness to commence insulin, if recommended (not at all, not very, moderately, very)
- Attitudes to insulin: ITAS Negative & Positive subscales⁵

Participants

- Eligible participants were 266 adults with T2D:
 - with a recent (<6mth) HbA1c above target $\geq 7.5\%$ (53 mmol/mol), taking maximum oral hypoglycaemic agents, but not currently using insulin

Statistical Analysis

- Bivariate analysis was conducted to identify baseline variables that differed significantly by insulin use at 12 months. These variables were entered into a hierarchical logistic regression, controlling for study arm

Results

- Participant characteristics are shown in Table 1
- At 12 months, 47% of participants were using insulin⁶
- These participants were more likely, at baseline, to have been randomised to the intervention, and:
 - have significantly higher HbA1c
 - report being "very willing" to initiate insulin
 - report less negative & more positive insulin appraisals
- Depressive symptoms and diabetes distress did not differ by insulin use at 12 months
- In the final regression model, being allocated to the intervention and reporting higher baseline HbA1c and being 'very willing' to begin insulin (compared to 'not at all') significantly predicted insulin use
- The independent contribution of attitudes to insulin (ITAS Negative and positive) was suppressed by the inclusion of 'willingness'

Table 1: Baseline demographic, clinical and psychological characteristics overall and by insulin use at 12 months

	Total (N=266)	Insulin using at 12 months		p
		No (n=140)	Yes (n=126)	
Randomised to intervention arm	151 (56.8%)	49 (35.0%)	102 (81.0%)	<0.001
Age, years	61.8 ± 10.1	62.3 ± 10.5	61.3 ± 9.6	0.455
Gender: women	103 (38.7%)	59 (42.1%)	44 (34.9%)	0.227
Socioeconomic status: IRSAD decile	6 (4,8)	6.5 (4,8)	6 (4,7)	0.032
Primary language: English	247 (91.9%)	132 (94.3%)	115 (91.3%)	0.340
Diabetes duration, years	8.5 (5, 13)	8 (5,13)	9 (5,13)	0.846
Hba1: mmol/mol	70 (64,82)	69 (62,78)	72 (66,85)	0.002
%	8.6 (8.0,9.6)	8.4 (7.8,9.3)	8.7 (8.2,9.9)	
Number of comorbidities	3 (2,5)	3 (2,5)	3 (2,5)	0.693
Body mass index	32.6 ± 6.5	33.0 ± 6.8	32.1 ± 6.1	0.294
PHQ-9 total (scored: 0-27)	4.5 ± 4.9	4.4±4.8	4.5±5.0	0.828
PAID total (scored: 0-100)	19.6 ± 18.1	19.6 ± 18.1	19.7 ± 18.3	0.979
Willingness to begin insulin:				0.002
Not at all willing	59 (22.6%)	39 (28.1%)	20 (16.4%)	
Not very willing	76 (29.1%)	46 (33.1%)	30 (24.6%)	
Moderately willing	76 (29.1%)	38 (27.3%)	38 (31.1%)	
Very willing	50 (19.2%)	16 (11.5%)	34 (27.9%)	
ITAS: Negative subscale (scored: 16-80)	46.8 ± 8.5	48.1 ± 8.1	45.5 ± 8.8	0.015
Positive subscale (scored: 4-20)	14.3 ± 2.1	14.0 ± 1.9	14.7 ± 2.3	0.006

Data are mean±SD, median (IQR), or n (%). Valid percentages reported. IRSAD = Index of Relative Socio-economic Advantage and Disadvantage; ITAS = Insulin Treatment Appraisal Scale; PAID = Problem Areas In Diabetes; PHQ-9 = Patient Health Questionnaire.

Table 2: Final model of hierarchical logistic regression predicting insulin use at 12 months

Step	Variable	b (lower, upper 95% CI)	SE	Exp(B)	p
Control variable	Randomisation (ref=control)	2.2 (5.0, 18.1)	0.33	9.5	<.001
Step 1	Socioeconomic status: IRSAD decile	-0.1 (0.8, 1.0)	0.1	0.9	0.048
Step 2	HbA1c	0.4 (1.1, 1.8)	0.1	1.4	0.004
Step 3	ITAS Negative score	-0.00 (0.9, 1.0)	0.00	1.0	0.289
	ITAS Positive score	0.1 (1.0, 1.4)	0.1	1.2	0.072
Step 4	Willingness (ref=not at all)				
	Not very willing	0.6 (0.7, 4.2)	0.4	1.8	0.189
	Moderately willing	0.6 (0.7,4.6)	0.5	1.9	0.176
	Very willing	1.7 (1.9 16.3)	0.5	5.6	0.001

Log likelihood= -265.5; Model: $\chi(8)=92.1$, p <0.001; Pseudo R2: Cox and Snell= 0.2998; Nagelkerke= 0.400

Ref= reference category; IRSAD = Index of Relative Socio-economic Advantage and Disadvantage; ITAS = Insulin Treatment Appraisals Scale.

Conclusion

- In addition to the Stepping Up model⁶, higher HbA1c and being 'very willing' to begin insulin at baseline enhanced the likelihood of insulin uptake among adults with T2D participating in a primary care based trial.
- This study highlights the importance of assessing and addressing barriers to insulin therapy within clinical care in order to encourage timely insulin initiation
- In addition to systemic & health professional level intervention, future research should look to develop and evaluate interventions to improve receptiveness to insulin therapy among people with T2D.

References

- Polonsky et al. *Current Medical Research and Opinion* 2011, 27(6):1169-74; 2. Furler et al. *Implementation Science* 2014, 9:20; 3. Kroenke et al. *JGIM*. 2001, 16:606-16; 4. Polonsky et al. *Diabetes Care*. 1995, 18(6):754-6;5. Snoek et al. *Health and Quality of Life Outcomes* 2007, 5; 6. Furler et al. *ADS-ADEA Annual Scientific Meeting*, Adelaide 2015.

Acknowledgements

We would like to thank the Stepping Up participants and acknowledge the Stepping Up Investigators and study team. The Stepping Up study was funded by the Australian NHMRC (APP1023738) and supported by a Roche Diabetes Care educational/research grant, the RACGP Foundation RACGP/Independent Practitioner Network Pty Ltd (IPN) Grant and in-kind from Sanofi. EHT was supported by an Australian Postgraduate Award.

Enquiries

Elizabeth Holmes-Truscott E: etruscott@acbrd.org.au