Supplementary file 2: Literature review templates

The template was used to present a one-page summary of each intervention identified in the literature review to the working group.

Examples of the completed template are provided for the four interventions that were of initially of interest to the working group (see Results: Step 5 in main manuscript).

Study details	Author (Date)	Mosen et al. (2015)[1] [reports a different analysis of the same intervention / study data as Mularski et al. 2012]
	Country	USA
	Data years	2008-11
	Study design	Pre-post
	Sample (patients)	Pre: 1277; Post1: 4811; Post2: 5465; Total: 11553

Target population	Setting	Non-ICU; Surgical (Post anesthesia care unit)
	Patients	Diabetics, Hyperglycaemics
	Target	Glycaemic control, Insulin
	Glycaemic target	70-180 (3.9-10.0)

Intervention	Pharmacist service (**Pharmacist led Glycaemic Control Team (GCT)**) Post anesthesia care unit (PACU) for any surgical patient requiring perioperative glycemic control management Pharmacists given training Pharmacists role: - Availability: for consultation 7 days / week [hours?] - Insulin orders and coordinating all aspects of glucose control perioperatively including discharge planning for diabetics Evaluated after implementation at 1 year and 2 years
	Pre-intervention (NR)

	Outcome	**Severe hypoglycaemia**	**Hypoglycaemia**	**HypERglycaemia**	**Severe hypERglycaemia**
Effect	Baseline, post-implementation (1y), post-implementation (2y)		<70 (<3.9)		
	% of patients		**Significant reduction** pre-post1 RR: 0.38 (pre: 19% v post1: 7.2%) pre-post2 RR: 0.30 (pre: 19% v post2: 5.7%) post1-post2 RR: 0.79 (post1: 7.2% v post2: 5.7%), p: <0.0001 (all)		

Audit	Events in surgical division = 117 (35.6%) Admissions in surgical division ≈ 24 (25.8%) Location of events post-op = 3 (0.9%) [intervention appears to extend beyond immediate post-op period]
Notes	BGL outcomes evaluated during days 1 to 3 following the PACU admission date

Effects are formatted as “RR (percentage in baseline v intervention), p value”. RR: Relative risk. NR: Not reported. NS: Not significant.

Study details	Author (Date)	Mularski et al. (2012)[2] [reports a different analysis of the same intervention / study data as Mosen et al. 2015]
	Country	USA
	Data years	2008-2010
	Study design	Pre-post
	Sample (patients)	Pre: 1294; Post: 4842; Total: 6136

Target population	Setting	Non-ICU; Surgical (**peri-operative**)
	Patients	Diabetics, Hyperglycaemics,
	Target	Glycaemic control, Insulin
	Glycaemic target	70-180 (3.9-10.0)

Intervention	Pharmacist service (**Pharmacist led Glycaemic Control Team (GCT)**) GCT protocol developed by pharmacy clinical coordinator + physicians Pharmacists given education Pharmacists role: - Availability: On call pharmacist, 7 days / week, 10 hours / day - Chart review + Patient meeting (history, patient diabetes education / information, discharge planning) + Nurse meeting - Insulin orders - Daily electronic progress note (structured) Others involved as needed: certified diabetes educator, dietician, and the patient's nurse
	Pre-intervention (NR)

	Outcome	**Severe hypoglycaemia**	**Hypoglycaemia**	**HypERglycaemia**	**Severe hypERglycaemia**
Effect	Pre, during, post	<40 (<2.2)	<70 (<3.9)		
	% of patient days	**Reduction** (p NR) RR: 0.67 (pre: 1.5% v post: 1.0%), p: NR	**Reduction** (p NR) RR: 0.46 (pre: ~10.0% v post: 4.6%), p: NR		

Audit	Events in surgical division = 117 (35.6%) Admissions in surgical division ≈ 24 (25.8%)
Notes	Surgery = day 1, evaluated BGL outcomes on days 1 to 3

Effects are formatted as "RR (percentage in baseline v intervention), p value". RR: Relative risk. NR: Not reported. NS: Not significant.

Study details	Author (Date)	Rushakoff et al. (2017a)[3]; Rushakoff et al. (2017b)[4] [both papers report on the same analysis of the same intervention / study data]
	Country	USA
	Data years	2012-2015
	Study design	Pre-post
	Sample (patients)	Pre: 22025; During: 22401; Post: 24079; Total: 68505

Target population	Setting	Hospital-wide; Medical, Surgical, ICU
	Patients	All on insulin (insulin pump), Diabetics (type 1), Hypoglycaemics, Hyperglycaemics
	Target	Glycaemic control, Insulin, Disglycaemia
	Glycaemic target	70-180 (3.9-10.0)

Intervention	**Virtual Glycaemic Management Service (vGMS)** (team includes: endocrinologist, nurse certified diabetes educator (CDE), pharmacist CDE) - EMR based-insulin order sets with BGL measurement orders and hypoglycaemia treatment orders + PoC-BGL automatically uploaded into EMR + carbohydrate intake (grams) entered in EMR - daily automated report (at 05.30) of adult patients with 1+ BGL <70 (3.9 mmol/L) or 2+ BGL ≥225 mg/dL (12.5 mmol/L) in last 24 hours, on insulin pump or type 1 diabetic - vGMS review patients EMR + enter glucose management (insulin) note if required - note viewed by clinicians during morning rounds Evaluation during (implementation year) and post-intervention (year after roll out)
	Pre-intervention: Had in place an EMR with PoC-BGL measures automatically uploaded in real time, and computerised insuliin orders sets.

	Outcome Pre, ~~during~~, post	**Severe hypoglycaemia** <40 (<2.2)	**Hypoglycaemia** <70 (<3.9)	**HypERglycaemia** ≥225 (≥12.5)	**Severe hypERglycaemia**
Effect	% of patient days	**Significant reduction** RR: 0.31 (pre: 0.033% v post: 0.010%), p: 0.001	**Significant reduction** RR: 0.63 (pre: 0.78% v post: 0.49%), p: <0.001	**Significant reduction** RR: 0.61 (pre: 6.6% v post: 4.0%), p: <0.001	

Audit	Scanning hospital-wide (excluding obstetric) Events in reported groups: • Hyper (2x >12.5) within 24 hours = 46 (14.0%) • Hypo (<4.0) within 24 hours = 119 (36.7%) • Type 1 diabetics = 70 (21.3%) • Insulin pump = 0 (from memory 1x during labor with hypo after ceased pump) • All together = 187 (57.7%)
Notes	Outcome assessed in POC BGLs in days 1 to 28 Excluded obstetric patients

Effects are formatted as "RR (percentage in baseline v intervention), p value". RR: Relative risk. NR: Not reported. NS: Not significant.

Study details	Author (Date)	Sinha Gregory, Seley, Ukena et al. (2018)[5]
	Country	USA
	Data years	2016-2017
	Study design	Pre-post
	Sample (patients)	Pre: 566; Post: 642; Total: 1208

Target population	Setting	Non-ICU; Medical [2x medical units]
	Patients	All patients
	Target	Insulin, HyPOglycaemia, Hypoglycaemia prevention
	Glycaemic target	70-180 (3.9-10.0)

Intervention	**Root cause survey with targeted education** **Root cause survey:** 1. RN surveys about causes 2. Active surveillance - automated electronic tool in EMR (Sunrise) checked for recent hypoglycemic events among the users' patients at login to Sunrise Clinical Manager, if found, launched survey tool on cause of the hypoglycaemia. 3. Retrospective chart review of all patients experiencing hypoglycemic events on the two study units 4. Responses reviewed / categorised (after 2 months) to identify the top 2 modifiable causes - insulin and changes in nutrition **Targeted education:** THEN addressed with targeted education for nurses, physicians, physicians assistants on insulin delivery (10-minute PowerPoint presentation plus one-page handout of main points, focussed on insulin action and a dose adjustment algorithm to titrate insulin).
	Pre-intervention (NR)

	Outcome	**Severe hypoglycaemia**	**Hypoglycaemia** <70 (<3.9)	**HypERglycaemia** >180 (>10.0)	**Severe hypERglycaemia**
Effect	% of BGL measurements		**Significant reduction** RR: 0.68 (pre: 2.27% v post: 1.55%), p: <0.001	**Significant reduction** RR: 0.85 (pre: 38.3% v post: 32.8%), p: <0.001	

Audit	Medical division = 145 (44.1% of events)
Notes	BGL outcomes during the admission

Effects are formatted as "RR (percentage in baseline v intervention), p value". RR: Relative risk. NR: Not reported. NS: Not significant.

Study details	Author (Date)	Aloi et al. (2017)[6]
	Country	USA
	Data years	NR
	Study design	Observational crossover study
	Sample (patients)	Total: 993 (x3) crossover trial [crossover study design]

Target population	Setting	Non-ICU; Hospital-wide
	Patients	All on insulin (insulin pump), Diabetics (type 1), Hypoglycaemics, Hyperglycaemics
	Target	Glycaemic control, Insulin [subcutaneous]
	Glycaemic target	140-180 (7.8-10.0)

Intervention	**Glucommander** is an **electronic glycaemic management system (eGMS)** that calculated subcutaneous (SC) insulin dosages ('during GM group'). - SC insulin initiated by a provider order that calculated total daily dose of insulin as basal and prandial insulin doses. - All daily titrations for basal, prandial and correctional (when needed) insulin doses calculated by eGMS without additional orders from the provider (until the patient was removed from therapy and managed by the provider). - Nurses accessed the eGMS through the EMR. - eGMS recommended full, partial, or held prandial insulin doses through a series of on-screen prompts to the nurse. - Same target glucose range for control (140-180 mg/dL). Evaluation used pre ('before GM'), during GM, and post ('after GM') intervention periods.
	Crossover (control) conditions: Pre ('before GM') and post ('after GM') intervention periods. SC insulin therapy directed by providers using computerized basal/bolus order set. Initial doses prescribed by body weight in kg or customized at provider's discretion. Titrated daily by provider order as needed.

	Outcome	**Severe hypoglycaemia**	**Hypoglycaemia**	**HypERglycaemia**	**Severe hypERglycaemia**
Effect	Pre ('before GM') During (GM) Post ('after GM') [crossover trial]	<40 (<2.2)	<70 (<3.9)	>180 (>10.0)	
	% of BGL measurements	**No change** (p) pre-during RR: 0.43 (0.14 v 0.06), p: 0.3 post-during RR: 0.25 (0.06 v 0.24), p: 0.6	**Significant reduction** pre-during RR: 0.73 (2.6 v 1.9), p: 0.001 post-during RR: 0.68 (1.9 v 2.8), p: 0.001	**Significant reduction** pre-during RR: 0.71 (51.0 v 36.0), p: 0.001 post-during RR: 0.59 (36.0 v 61.0), p: 0.001	

Audit	Hospital-wide = 329 (100%) On insulin = 277 (84.2%)
Notes	BGL outcomes measured while on each protocol (crossover trial)

Effects are formatted as "RR (percentage in baseline v intervention), p value". RR: Relative risk. NR: Not reported. NS: Not significant.

References in Supplementary File 2

1. Mosen DM, Mularski KS, Mularski RA, et al. Pharmacist glycemic control team associated with improved perioperative glycemic and utilization outcomes. *American Journal of Pharmacy Benefits.* 2015; 7(5): E127-E134.
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3. Rushakoff RJ, Rushakoff JA, Kornberg Z, et al. Remote monitoring and consultation of inpatient populations with diabetes. *Current Diabetes Reports.* 2017; 17(9): 70. DOI: 10.1007/s11892-017-0896-x.
4. Rushakoff RJ, Sullivan MM, MacMaster HW, et al. Association between a virtual glucose management service and glycemic control in hospitalized adult patients: an observational study. *Annals of Internal Medicine.* 2017; 166(9): 621. DOI: 10.7326/M16-1413.
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6. Aloi J, Bode BW, Ullal J, et al. Comparison of an electronic glycemic management system versus provider-managed subcutaneous basal bolus insulin therapy in the hospital setting. *Journal of Diabetes Science and Technology*. 2017; 11(1): 12-16. DOI: 10.1177/1932296816664746.