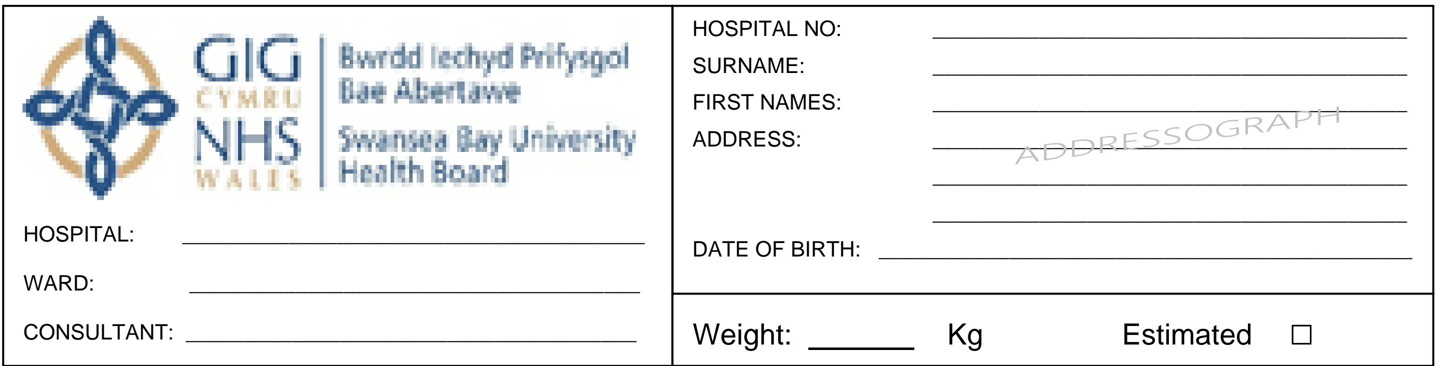
ADULT VARIABLE RATE INSULIN INFUSION (VRII) ADMINISTRATION CHART



HOSPITAL: ______________________

WARD: ______________________

CONSULTANT: ______________________

HOSPITAL NO: ______________________

SURNAME: ______________________

FIRST NAMES: ______________________

ADDRESS: ______________________ ADDRESSOGRAPH

DATE OF BIRTH: ______________________

Weight: ________ Kg Estimated ☐

- This chart is ONLY for prescribing **VARIABLE RATE INTRAVENOUS INSULIN (VRII)**
- This chart is NOT to be used in patients with DKA or HHS or patients who are able to eat and drink adequately
- **All patients requiring VRII for more than 24 hours must be referred to diabetes team**

- **VRII can be used in patients with type 1 and type 2 diabetes to achieve normoglycaemia in circumstances when the usual treatment with SC insulin is not possible: patients who are nil by mouth, vomiting or have uncontrolled hyperglycaemia.**
- **Aim to achieve a capillary blood glucose (CBG) targets of 6.0 – 12.0 mmol/L**
- **If patient takes subcutaneous long acting insulin [isophane (Insulatard®), glargine (Lantus®, Toujeo®, Abasaglar®), detemir (Levemir®) or degludec (Tresiba®, Xultophy®)], continue at the usual dose & time.**

VARIABLE RATE INSULIN INFUSION (VRII) INITIATING AND MAINTENANCE GUIDANCE

- **Use Standard VRII Scale (from table below) as first choice in most patients to start VRII as per initial CBG level.**
- **Titrate VRII up or down the Standard VRII Scale as per hourly CBG level.**
- **Monitor hourly CBG to achieve target range of 6.0-12.0 mmol/L.**
- **If CBG above target range but still falling, continue VRII infusion at appropriate rate for CBG level on Standard VRII Scale.**
- **If CBG above target range but not falling for 6 hours despite maximum up-titration of insulin infusion rates on Standard VRII Scale, then move to Increased VRII Scale for insulin resistant patients.**
- **If CBG < 6 mmol/L for two consecutive hours, move to the Reduced VRII Scale for insulin sensitive patients.**
- **If target CBG not achievable on any of the three pre-set VRII scales, then seek diabetes team advice to set Individualized VRII Scale.**
- **Calculate the total daily insulin (TDI) in patients already treated with insulin. If TDI >100units/day, start directly on the Increased VRII Scale; if TDI <40units/day start on Reduced VRII Scale.**
- **Once target CBG range (6.0-12.0mmol/L) achieved, reassess the need for continuation of VRII every 24 hours.**

VARIABLE RATE INSULIN INFUSION (VRII) PRESCRIPTION

DATE	INSULIN	DOSE	FLUID	VOLUME	ROUTE	STARTING SCALE *(tick the relevant box)*	PRESCRIBER SIGNATURE	PHARMACY
	Actrapid	**50 units**	**0.9% Sodium chloride**	**Make up to 50 mL**	**IV**	**Standard** ☐ **Increased** ☐ **Reduced** ☐ ***Individualized*** ☐	**bleep No:**	

DATE	TIME GIVEN	GIVEN BY	CHECKED BY	DATE	TIME GIVEN	GIVEN BY	CHECKED BY	DATE	TIME GIVEN	GIVEN BY	CHECKED BY

Table: Insulin Infusion Rates for VRII (ml/hour)
Start the Standard VRII Scale for most patients unless otherwise indicated

Blood glucose (mmol/L)	**Reduced VRII Scale** TDI < 40units/day (insulin sensitive)	**Standard VRII Scale** TDI= 40 -100units/day (Standard scale)	**Increased VRII Scale** TDI >100units/day (Insulin resistant)	*Individualized VRII Scale* ***(Contact diabetes team)***	*Individualized VRII Scale* ***(Contact diabetes team)***
≤4.0	0 (Call doctor)	0 (Call doctor)	0 (Call doctor)		
4.1 – 6.0	0.25	1	2		
6.1 – 12.0	0.5	2	3		
12.1 – 14.0	1	3	4		
14.1 – 17.0	3	4	5		
17.1 – 20.0	4	5	6		
>20.0	5	6	7		

VARIABLE RATE INSULIN ADMINISTRATION AND MONITORING RECORD

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CID: 1688 Published: December 2015 Last Reviewed: May 2022 Next Review Due: May 2024

PATIENT'S NAME... **HEALTH RECORD NUMBER**...............................….

POTASSIUM REPLACEMENT (KCl)	
OVER 5.5mmol/L	NIL
3.5mmol/L to 5.5mmol/L	20mmol/L
BELOW 3.5mmol/L	40mmol/L (see opposite box)

POTASSIUM REPLACEMENT REGIME

- **If potassium <3.5mmol/L on admission bloods, WITHHOLD insulin and replace potassium: give 1L 0.9% Sodium chloride containing 40 mmol/L potassium over 2hr via a peripheral line (with cardiac monitoring).**
- **Maintain potassium between 4.0 & 5.5 mmol/L.**
- **Monitor potassium daily in patients on VRII and more frequently if there is renal impairment**

INTRAVENOUS FLUIDS REGIME WITH VRII

- **A standard intravenous fluid infusion regime for patients on VRII is prescribed below**
- **Administer 0.9% Sodium chloride if capillary glucose >14.0 mmol/L**
- **Administer 5% Dextrose if capillary glucose ≤14.0 mmol/L**
- **Administer 10% Dextrose at a slower rate (42 mls/hr) if high risk of fluid overload and glucose ≤14.0 mmol/L: advanced renal impairment (eGFR <15) or end stage renal failure on dialysis, heart failure, pregnancy, elderly**

INTRAVENOUS NORMAL SALINE REGIME

Commence if capillary glucose >14.0 mmol/L

DATE	FLUID	**POTASSIUM** CIRCLE AS APPROPRIATE	RATE (mL/hr) CIRCLE AS APPROPRIATE	PRESCRIBER'S SIGNATURE	DATE	TIME GIVEN	GIVEN BY	CHKD BY
	0.9% Sodium chloride 1 litre	Nil / 20mmol / 40mmol	125 / other……..					
Batch No.	Device No.	*Prescriber to initial if continuous →		bleep No.				
	0.9% Sodium chloride 1 litre	Nil / 20mmol / 40mmol	125 / other……..					
Batch No.	Device No.	*Prescriber to initial if continuous →		bleep No.				
	0.9% Sodium chloride 1 litre	Nil / 20mmol / 40mmol	125 / other……..					
Batch No.	Device No.	*Prescriber to initial if continuous →		bleep No.				
	0.9% Sodium chloride 1 litre	Nil / 20mmol / 40mmol	125 / other……..					
Batch No.	Device No.	*Prescriber to initial if continuous →		bleep No.				

INTRAVENOUS 5% DEXTROSE REGIME

Commence if capillary glucose ≤14.0 mmol/L

DATE	FLUID	**POTASSIUM** CIRCLE AS APPROPRIATE	RATE (mL/hr) CIRCLE AS APPROPRIATE	PRESCRIBER'S SIGNATURE	DATE	TIME GIVEN	GIVEN BY	CHKD BY
	5% Dextrose 1 Litre	Nil / 20mmol / 40mmol	125 / other……..					
Batch No.	Device No.	*Prescriber to initial if continuous →		bleep No.				
	5% Dextrose 1 Litre	Nil / 20mmol / 40mmol	125 / other……..					
Batch No.	Device No.	*Prescriber to initial if continuous →		bleep No.				
	5% Dextrose 1 Litre	Nil / 20mmol / 40mmol	125 / other……..					
Batch No.	Device No.	*Prescriber to initial if continuous →		bleep No.				
	5% Dextrose 1 Litre	Nil / 20mmol / 40mmol	125 / other……..					
Batch No.	Device No.	*Prescriber to initial if continuous →		bleep No.				

INTRAVENOUS 10% DEXTROSE REGIME

Commence at a slower rate (below 42 mL/hr) if capillary glucose ≤14.0 mmol/L in patients with high risk of fluid overload:

• Advanced renal impairment (eGFR < 15), end stage renal failure on dialysis • Heart failure • Pregnancy

DATE	FLUID	POTASSIUM	RATE (mL/hr)	PRESCRIBER'S SIGNATURE	DATE	TIME GIVEN	GIVEN BY	CHKD BY
	10% Dextrose 500 mL	Nil / 20mmol	42 / other……..					
Batch No.	Device No.	*Prescriber to initial if continuous →		bleep No.				
	10% Dextrose 500 mL	Nil / 20mmol	42 / other……..					
Batch No.	Device No.	*Prescriber to initial if continuous →		bleep No.				
	10% Dextrose 500 mL	Nil / 20mmol	42 / other……..					
Batch No.	Device No.	*Prescriber to initial if continuous →		bleep No.				

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PATIENT'S NAME..**HEALTH RECORD NUMBER**..................................

GENERAL VRII GUIDANCE AND SUBCUTANEOUS INSULIN ADMINISTRATION

- **KEY MESSAGE: Long acting (basal) insulin should be continued while on VRII but rapid acting and premixed insulin has to be withheld**
- **If patient takes long acting (basal) insulin, ALWAYS continue at usual dose & time [isophane (Insulatard®, Humulin I®, Insuman Basal®), glargine (Lantus®, Toujeo®, Abasaglar®), detemir (Levemir®) or degludec (Tresiba®, Xultophy®)]**
- **A large bore peripheral cannula which is visible is needed for the VRII (do not cannulate the foot). If venous access is inadequate, liaise with the anaesthetic team regarding central venous cannulation. Separate infusions of fluids and insulin should run to a single venous cannula**
- **When SWITCHING to subcutaneous insulin from insulin infusion, wait till meal time and ensure patient will be able to eat and drink; there MUST be a 30 minute overlap between giving the injection of fast acting insulin or premixed insulin and stopping insulin infusion**
- **For INSULIN NAÏVE PATIENTS (if basal insulin is needed when VRII taken down) administer Lantus® - dose calculated by multiplying patient's weight (in kg) by 0.25 units example: 60kg person would require approximately 60 x 0.25 units or 15 units of Lantus daily**

ENTER DOSE AGAINST TIME REQUIRED WRITE THE INSULIN DOSE WITHOUT THE WORD 'UNITS'			
DATE ⇨			
ROUTE ⇨		S/C	S/C
INITIALS ⇨			
SPECIFY TIME IF REQUIRED ↓		bleep	bleep
		Units	Units
Breakfast		Units	Units
Lunch		Units	Units
Supper		Units	Units
Bedtime		Units	Units
		Units	Units

MONTH:			YEAR:			
DATE:						
INSULIN (FULL BRAND NAME)		STRENGTH Units/ mL	DEVICE AND SPECIAL INSTRUCTIONS	PRESCRIBER'S SIGNATURE BLEEP		PHARMACY / SUPPLY

ENTER DOSE AGAINST TIME REQUIRED WRITE THE INSULIN DOSE WITHOUT THE WORD 'UNITS'			
DATE ⇨			
ROUTE ⇨		S/C	S/C
INITIALS ⇨			
SPECIFY TIME IF REQUIRED ↓		bleep	bleep
		Units	Units
Breakfast		Units	Units
Lunch		Units	Units
Supper		Units	Units
Bedtime		Units	Units
		Units	Units

MONTH:			YEAR:			
DATE:						
INSULIN (FULL BRAND NAME)		STRENGTH Units/ mL	DEVICE AND SPECIAL INSTRUCTIONS	PRESCRIBER'S SIGNATURE BLEEP		PHARMACY / SUPPLY

ENTER DOSE AGAINST TIME REQUIRED WRITE THE INSULIN DOSE WITHOUT THE WORD 'UNITS'			
DATE ⇨			
ROUTE ⇨		S/C	S/C
INITIALS ⇨			
SPECIFY TIME IF REQUIRED ↓		bleep	bleep
		Units	Units
Breakfast		Units	Units
Lunch		Units	Units

MONTH:			YEAR:			
DATE:						
INSULIN (FULL BRAND NAME)		STRENGTH Units/ mL	DEVICE AND SPECIAL INSTRUCTIONS	PRESCRIBER'S SIGNATURE BLEEP		PHARMACY / SUPPLY

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Supper		Units	Units							
Bedtime		Units	Units							
		Units	Units							

HYPOGLYCAEMIA PREVENTION AND MANAGEMENT (while on VRII)

- **Ideally no patient on VRII should become hypoglycaemic as maintenance fluids are switched from normal saline to 5% dextrose infusion alongside VRII as soon as the capillary blood glucose (CBG) level is ≤14.0 mmol/L and insulin infusion rate is down-titrated as per CBG level to achieve target range of 6-12 mmol/L.**
- **If CBG < 6 mmol/L for two consecutive hours, move to the Reduced VRII Scale for insulin sensitive patients (Table on page 1).**
- **If CBG < 6 mmol/L despite the Reduced VRII Scale for insulin sensitive patients, recheck venflon patency, exclude pump malfunction and switch 5% dextrose to 10% dextrose at a rate appropriate for the fluid status. Send venous glucose to lab for check and consider setting Individualized VRII Scale as per diabetes team advice. Reassess the need for continuation of VRII.**
- **If CBG falls below 4.0 mmol/L, stop VRII, continue dextrose infusion and treat hypoglycaemia according to the protocol below. If patient is 'Nil By Mouth' or CBG ≤3.0 mmol/L or symptoms of severe hypoglycaemia (drowsiness, unconsciousness, seizures or aggressive behavior) treat as per severe hypoglycaemia with 20% intravenous dextrose. Check capillary glucose every 15 minutes due to risk of rebound hyperglycaemia. *Restart VRII when blood glucose >10mmol/L on the Reduced VRII Scale or seek diabetes team advice to reset an Individualized VRII Scale.***
- **After any hypoglycaemic episode on VRII, once treated, re-assess the indication for continuation of VRII. If *any* doubt, contact the diabetes team.**
- **All patients with severe hypoglycaemia or CBG ≤3mmol/L while on VRII *must* be referred to diabetes team.**

TREATMENT OF HYPOGLYCAEMIA – BLOOD GLUCOSE ≤4.0 MMOL/L

Wherever possible, check blood glucose level prior to treatment. If patient asymptomatic, repeat test.

MILD	MODERATE	SEVERE
Patient conscious. Trembling, sweating, hungry, tingling, headache, anxiety, palpitations, nausea, forgetfulness.	Patient conscious but in need of assistance. Difficulty concentrating, confusion, weakness, giddiness, drowsiness, unsteady, headache, dizziness, difficulty focusing	***…or any patient who is 'Nil By Mouth'*** Patient unconscious and unable to swallow. Unconscious, fitting
STEP 1		
STOP INSULIN INFUSION **Continue the dextrose infusion** Give 10g – 20g fast acting glucose: 3-5 x GlucoTabs (4g glucose per tablet) or 1 x 60mL bottle of GlucoJuice (15g glucose per bottle)	**STOP INSULIN INFUSION** **Continue the dextrose infusion** Give 1-2 tubes of GlucoGel (10g glucose per tube) **Ensure gag reflex is present**	**STOP INSULIN INFUSION** **Continue the dextrose infusion** **CALL FOR EMERGENCY HELP** **Check ABC** **Place patient in recovery position** **Infuse 100mls of 20% glucose over 15 minutes***
STEP 2		
Wait 15 minutes and recheck and record capillary blood glucose level If reading ≤4.0 mmol/L or if no physical improvement, repeat STEP 1 Repeat step 1 up to a maximum of 3 times If capillary glucose ≤4.0 mmol/L after 3 times or if clinically deteriorating despite treatments, treat as SEVERE hypoglycaemia		Once patient is conscious, if not ***'Nil By Mouth'*** give sips of GlucoJuice • Recheck glucose level every 15 minutes to ensure increase >4.0 mmol/L • If glucose ≤4.0 mmol/L, repeat x1 infusion of 100mls of 20% glucose over 15 mins

FOLLOW-UP

1. Document hypoglycaemia in the patient's notes (using hypo sticker).
2. Insulin should never be omitted following an episode of hypoglycaemia. Treat episode as above and restart VRII **when blood glucose >10 mmol/L at 1unit/hr on the Reduced VRII Scale**
3. Discuss with diabetes team if any doubts.
4. If not ***'Nil By Mouth':*** FOLLOW UP WITH STARCHY (LONG ACTING) CARBOHYDRATE ONCE capillary glucose >4.0 mmol/L
   If on enteral feed: Give bolus down tube of ½ carton Fortisip or enteral feed bolus as per the feed regimen.

Always refer patients to the diabetes team, post treatment, if they have had a hypoglycaemic event resulting in unconsciousness.

* Administer intravenous 20% Glucose via a secure cannula into a large vein using infusion pump.

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PATIENT'S NAME………………………………………………………**HEALTH RECORD NUMBER**……………………………..… **PATIENT'S NAME**………………………………………………………**HEALTH RECORD NUMBER**………………………………..…

GUIDE TO FREQUENCY OF MONITORING

- **All patients with VRII must have hourly capillary glucose monitoring**
- **T1DM should have capillary ketone checked if glucose >14mmol/L**
- **Check electrolytes daily & more frequently in renal failure patients**

VARIABLE RATE INSULIN MONITORING CHART

TARGET GLUCOSE 6.0 – 12.0mmol/L

- **Capillary glucose ABOVE 14mmol/L administer 0.9%Saline + 20mmol KCl**
- **Capillary glucose 14mmol/L or BELOW administer 5% Dextrose + 20mmol KCl**
- **Reassess the indication for continuing VRII daily and stop when appropriate**

Date	DAY 1	Date:	DAY 2	Date:

BLOOD GLUCOSE mmol per Litre (scale: 28, 24, 20, 16, 12, 8, 4, 0)

Above 14: *LIAISE WITH DOCTOR TO REVIEW TREATMENT REGIME*

OPTIMAL GLUCOSE TARGET

Below 4: *LIAISE WITH DOCTOR TO REVIEW TREATMENT REGIME*

TREAT HYPOGLYCAEMIA

Hours from start	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Test Time																								
Capillary Glucose (mmol/L)																								
Capillary ketones (mmol/L)																								
Insulin rate (mL/hr)																								
Vol in Syringe at start of hr																								
Vol. infused last hour	0																							
VRII Scale (specify): Standard/ Reduced/ Increased																								
5% Glucose (mL/hour)																								
0.9% Saline (mL/hour)																								
Doctor/Nurse Initial																								

Hours from start	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
Test Time																								
Capillary Glucose (mmol/L)																								
Capillary ketones (mmol/L)																								
Insulin rate (mL/hr)																								
Vol in Syringe at start of hr																								
Vol. infused last hour																								
VRII Scale (specify): Standard/ Reduced/ Increased																								
5% Glucose (mL/hour)																								
0.9% Saline (mL/hour)																								
Doctor/Nurse Initial																								

Date	DAY 3	Date:	DAY 4	Date:

BLOOD GLUCOSE mmol per Litre (scale: 28, 24, 20, 16, 12, 8, 4, 0)

Above 14: *LIAISE WITH DOCTOR TO REVIEW TREATMENT REGIME*

OPTIMAL GLUCOSE TARGET

Below 4: *LIAISE WITH DOCTOR TO REVIEW TREATMENT REGIME*

TREAT HYPOGLYCAEMIA

Hours from start	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
Test Time																								
Capillary Glucose (mmol/L)																								
Capillary ketones (mmol/L)																								
Insulin rate (mL/hr)																								
Vol in Syringe at start of hr																								
Vol. infused last hour																								
VRII Scale (specify): Standard/ Reduced/ Increased																								
5% Glucose (mL/hour)																								
0.9% Saline (mL/hour)																								
Doctor/Nurse Initial																								

Hours from start	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
Test Time																								
Capillary Glucose (mmol/L)																								
Capillary ketones (mmol/L)																								
Insulin rate (mL/hr)																								
Vol in Syringe at start of hr																								
Vol. infused last hour																								
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Doctor/Nurse Initial																								

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Swansea Bay University Health Board

Authorisation Form for Publication onto COIN

PLEASE ENSURE THAT ALL QUESTIONS ARE ANSWERED – IF NOT APPLICABLE PLEASE PUT N/A

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Name and Signature of Lead Pharmacist.	Jatinder Parmar
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(1) All policies need to comply with the Policy for the production, consultation, approval, publication and dissemination of strategies, policies, protocols, procedures and guidelines

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