

Workshop H

Enteral and parenteral feeding and diabetes management

Mark Green - Southampton General Hospital

Dr Vishakha Bansiya - Cambridge University NHS Foundation Trust

Disclosures

- Mark Green: Presenter fees Lilly
- Vishakha Bansiya: None

Instructions for joining the quiz

Go to [slido.com](https://www.slido.com)

Enter the first code – **4109018**

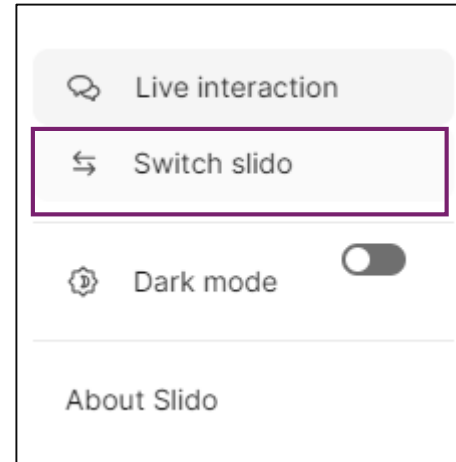
Joining as a participant?

Enter code here

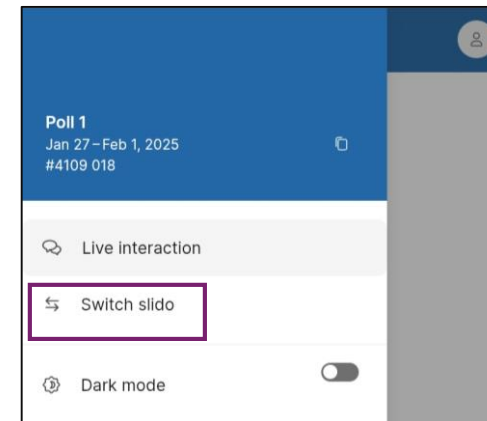
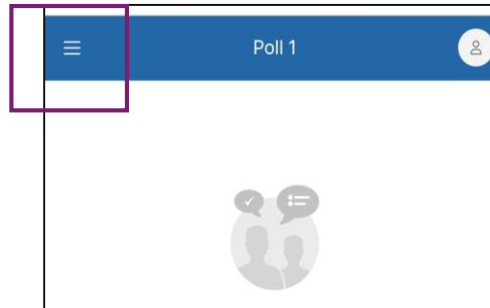


For next quiz

- On laptop – Switch Slido



- On Mobile – 3 bars



Enter the next code – **2852251**

Which insulin is linked to this profile?

Onset 15-60 mins; Peak 2-4 hours; Duration 12-14 hours

- A. Rapid and ultrafast acting insulins
- B. Regular Human insulins
- C. Isophane/intermediate acting insulins
- D. Long acting insulin analogues
- E. Pre-mixed insulins

Which profile does Humulin I match the closest to?

- | | | |
|----------------------|-----------------|----------------------|
| A. Onset 5-15 mins; | Peak 1-2 hours; | Duration 3-5 hours |
| B. Onset 30 mins; | Peak 2-4 hours; | Duration 6-8 hours |
| C. Onset 15-30 mins; | Peak 2-4 hours; | Duration 12-14 hours |
| D. Onset 2 hours; | Peak 4-8 hours; | Duration 14-16 hours |
| E. Onset 0-2 hours; | Peak None; | Duration 24-42 hours |

Mr A is on 24 hour NG feed.

Which of the following could be suitable regimens for this feed?

Total daily dose given as:

(Can choose more than 1 option)

- A. 1 dose of Glargine - every 24 hours
- B. 2 doses Humalog Mix 25 - 12 hours apart
- C. 2 doses Humulin I - 12 hours apart
- D. 3 doses of Novomix 30 - 8 hours apart
- E. 50% as 2 doses of Humulin I -12 hours apart and 50% divided into 6 doses of Trurapi -every 4 hours
- F. 100% divided in 6 doses of Novorapid - every 4 hours

You prescribe 5% dextrose to run at 125ml/hr along with a VRIII.
What is the per hour carb rate of this infusion?

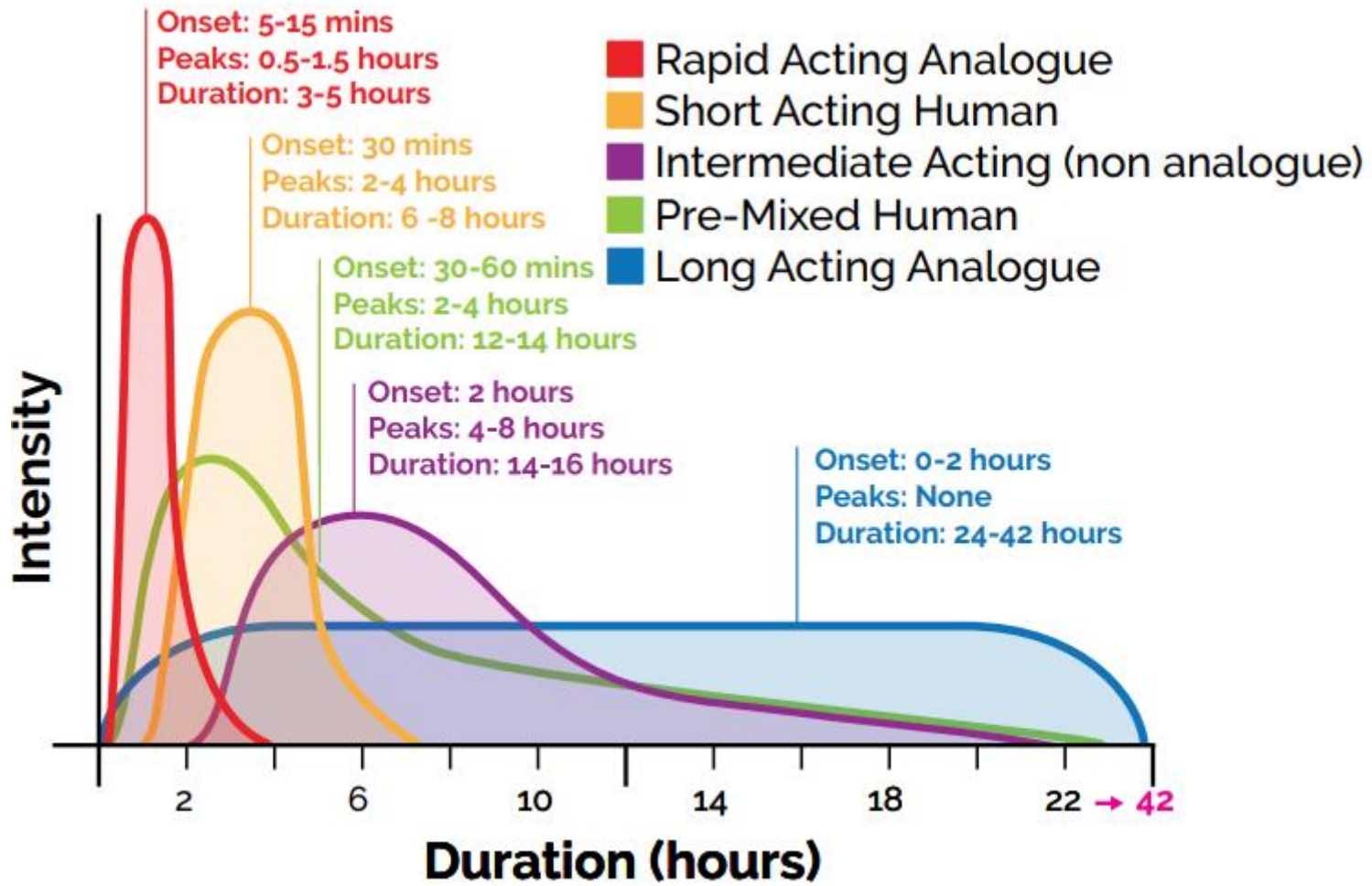
Ms B is on a 12 hour PN.

On the VRIII - she receives the following insulin units every hour -
3,3,3,3,2,2,2,2,1,1,1,1.

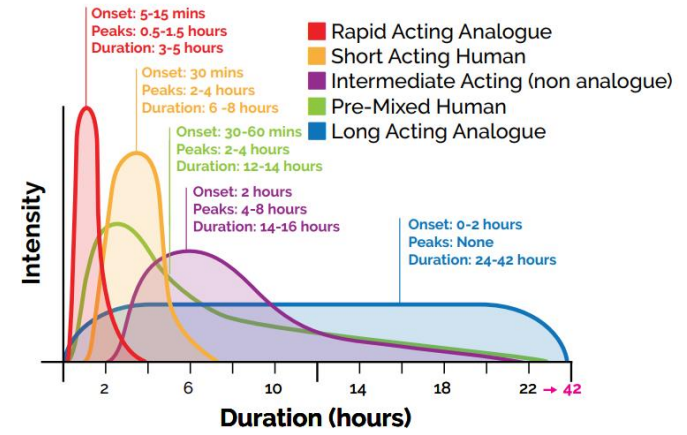
You determine that this equates to 24 units for the 12 hour duration.

What is your insulin of choice?

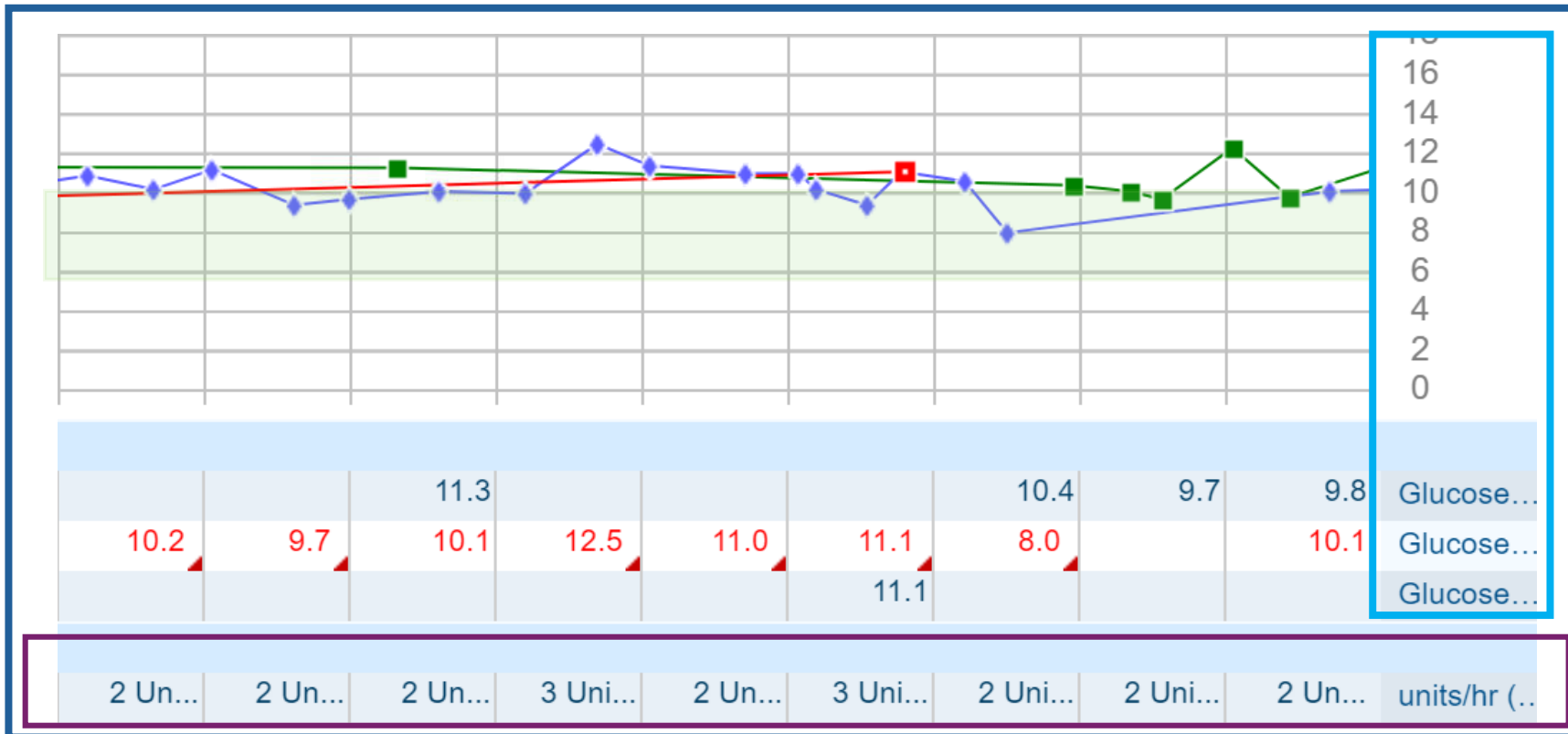
- A. 24 units of Humulin I at start of PN
- B. 24 units of Humalog Mix 25 at start of PN
- C. 24 units of Humulin M3 at start of PN
- D. 24 units of Humalog Mix 50 at start of PN



	Onset		Peak		Duration		
Rapid and ultra fast acting Analogues	5-15	mins	1-2	hours	3-5	hours	Fiasp, Trurapi, Novorapid, Humalog
Regular Human Insulins	30-60	mins	2-4	hours	6-8	hours	Humulin S, Actrapid
Isophane/ Intermediate	1-2	hours	4-8	hours	14-16	hours	Humulin I, Insulatard
Long acting Analogues	1-1.5	hours	5 hours	(flat)	24 -42	hours	Levemir, Glargine, Tresiba
Pre-mixed insulins	15-60	mins	2-4	hours	14-16	hours	Novomix 30, Humalog Mix 25, Humalog Mix 50
							Humulin M3



- 69 male
- BMI – 32.5 kg/m²
- No known diabetes
- HbA1c 1/12 back – 45 mmol/mol
- Creatinine 34, eGFR >90
- Traumatic brain injury + polytrauma
- Stepping down from NCCU to ward on NG feed
- Nutrison Protein plus Multifibre at 75ml/hrs x 20hrs, 211g CHO (10.5gCHO/hr)
- VRIII – 53 units in last 24 hours



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What do you estimate his total daily dose for NG feed could be?

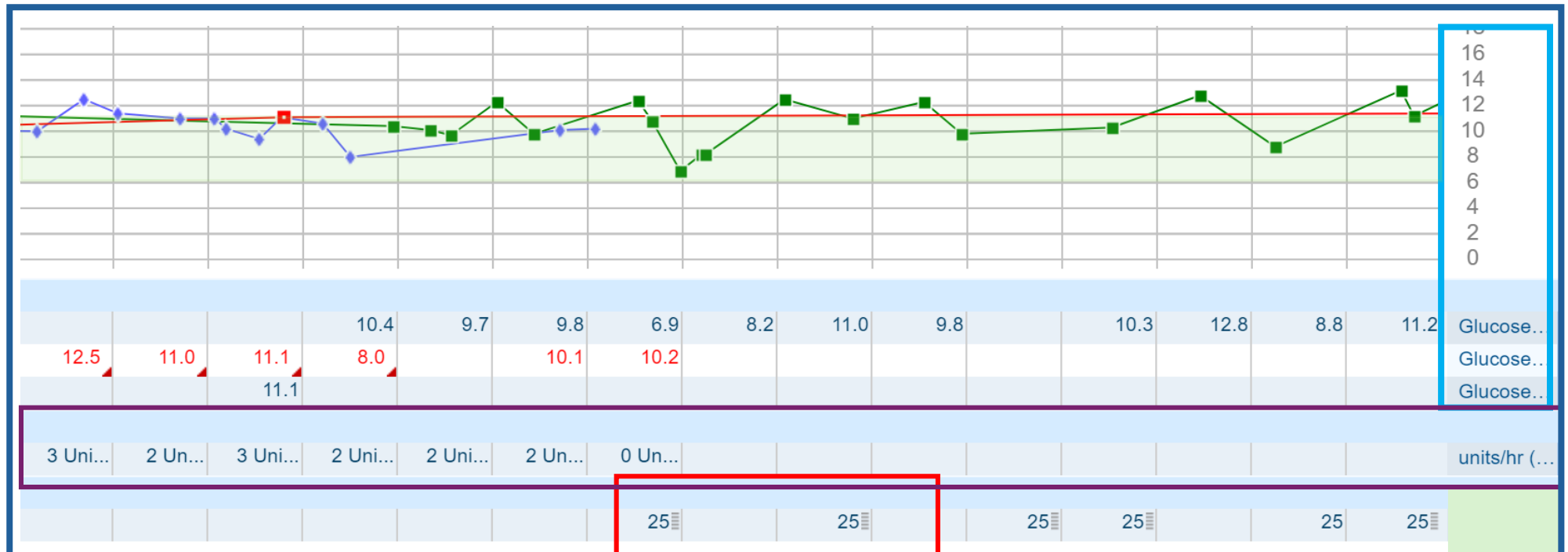
- 17-18 units based on 1:12 g – insulin naive
- 21-22 units based on 1:10 g – impaired glucose tolerance
- 48-53 units based on VRIII rates
- None of the above – have a different calculation in mind



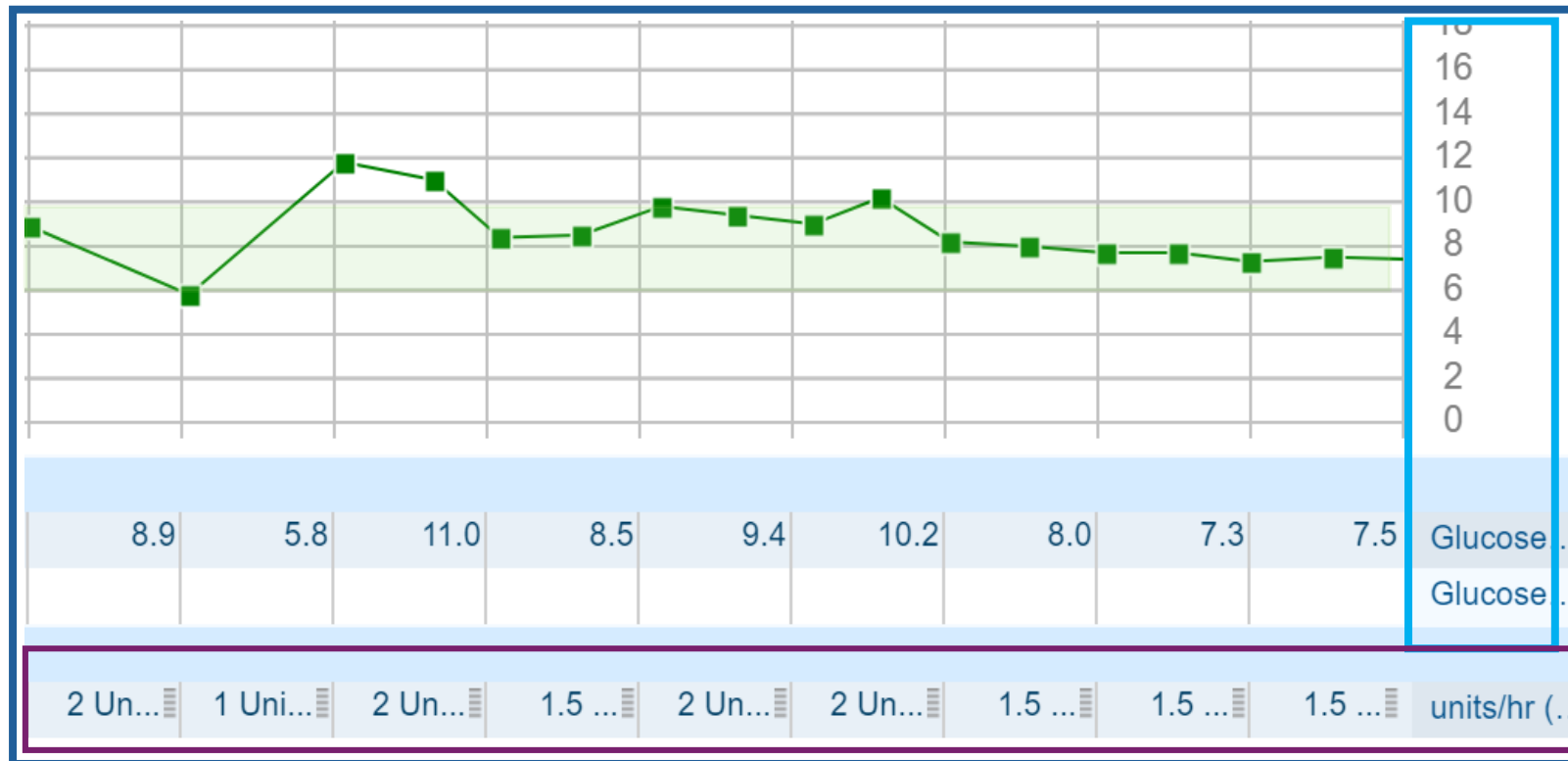
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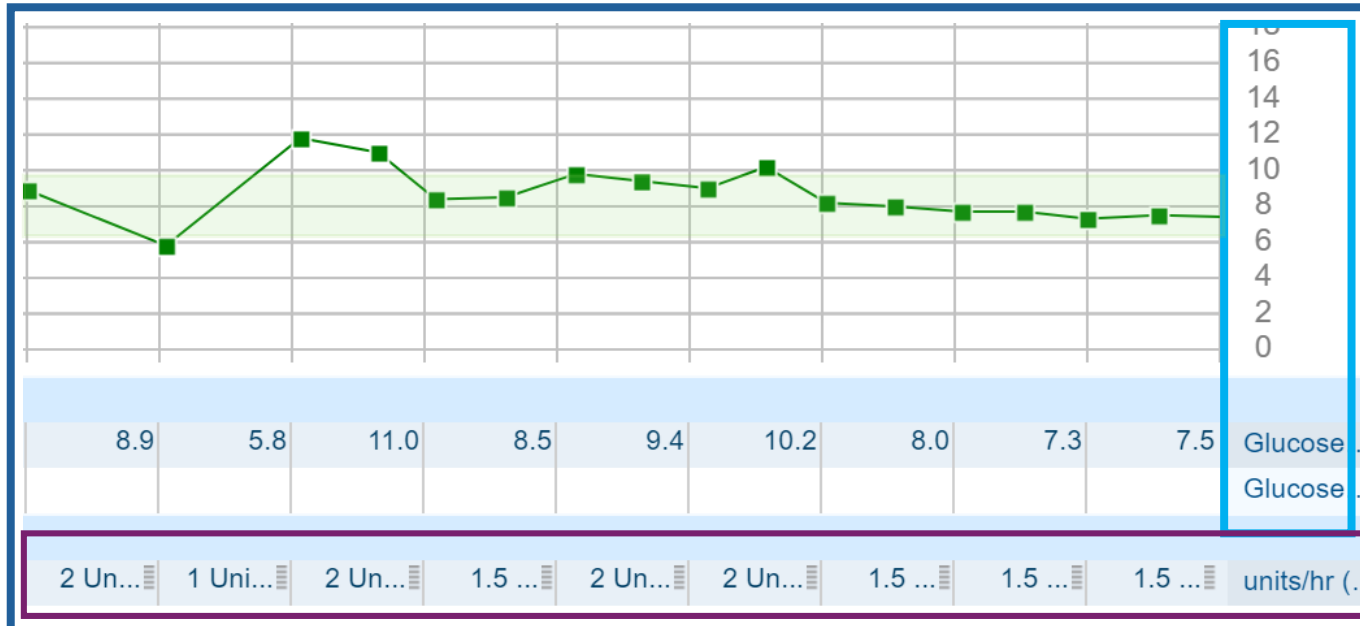
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- None of the above – have a different calculation in mind



- 57 male
- BMI – 22.8 kg/m²
- No known diabetes
- HbA1c 1/12 back – 42 mmol/mol
- Creatinine 40, eGFR >90
- Intraventricular bleed
- Stepping down from NCCU to ward on NG feed
- Nutrison Protein plus Multifibre at 72ml/hrs x 20hrs, 203g CHO (10.1gCHO/hr)
- VRIII – 39 units in last 24 hours



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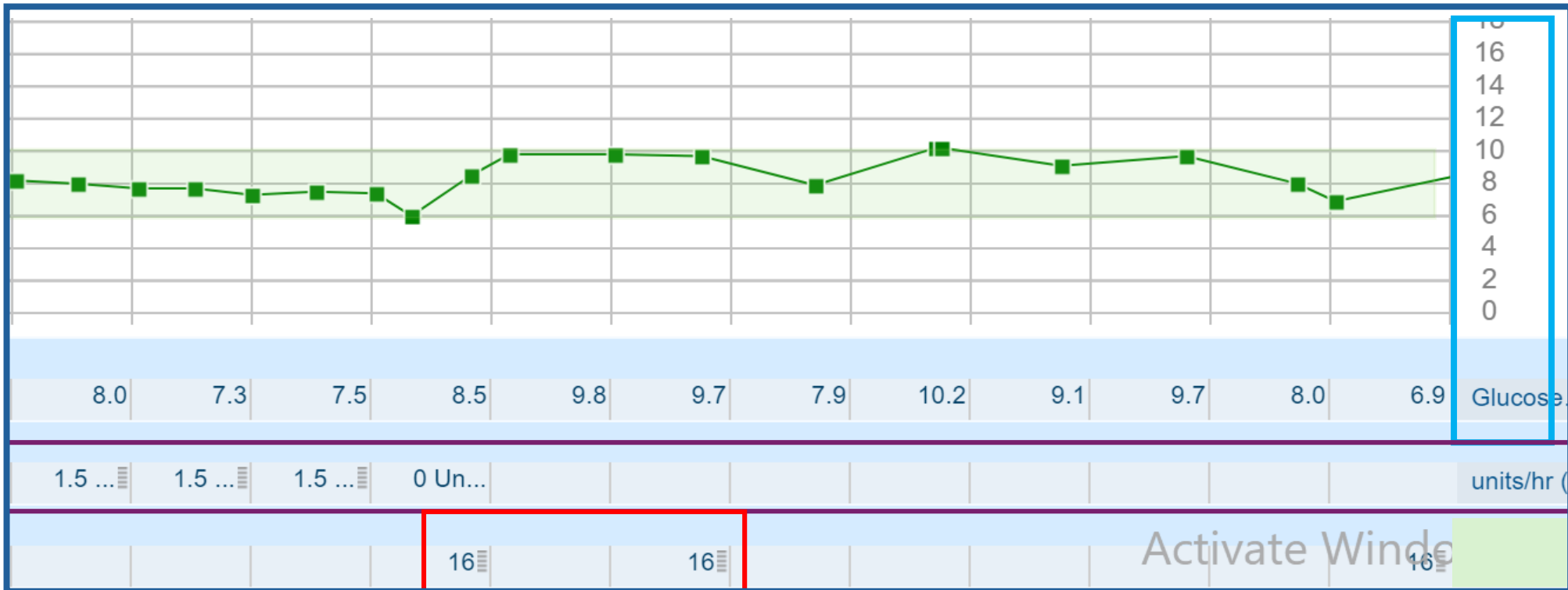
What do you estimate his total daily dose could be?

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- None of the above – have a different calculation in mind



- 76 year old female
- ICH
- Craniotomy, clot evacuation, brain biopsy, left sided weakness
- Step down from NICU
- T2DM
- Normally, Metformin MR 1g, Dapagliflozin 10mg, Linagliptin 5mg, Lantus OD 28 units
- BMI 25kg/m², weight 78kg
- HbA1c 51mmol/mol pre admission
- eGFR >90 baseline with intermittent AKI's
- NG feed
- NBM initially but starts eating over the course of feed.

Date	B'fast	Lunch	Dinner	Evenin g	Feed 6pm – 2pm 20 hours	Insulin (Humulin I)
15/11	19.9	24.2	18.7	21.7	NPP (1L) + N1kcal (0.5L) 20hr @75mL/hr	22 units pm
18/11	26.3	27.7	25.5	22.7	NPP (1L) + N1kcal (0.5L) 20hr @75mL/hr	14 units am 30 units pm
19/11					NPP (1L) + N1kcal (0.5L) 20hr @75mL/hr	VRIII
21/11	21.7	22.1	16.9	18.9	NPP (1L) + N1kcal (0.5L) 20hr @75mL/hr	40 units am 90 units pm
22/11	20.3	21.8	14.4	15.1	NPP (1L) + N1kcal (0.5L) 20hr @75mL/hr	40 units am 108 units pm
24/11					NPP (1L) + N1kcal (0.5L) 20hr @75mL/hr	48 units am 108 units pm
25/11	6.4	8.9	9.4	7.3	NPP (1L) + N1kcal (0.5L) 20hr @75mL/hr	48 units am 108 units pm
28/11	8.9	13.7	9.4	4.1	NE 12 hour (0.5L) 12hr @42mL/hr	

Feed composition

Feed	Kcal/100g	Protein/100g	Carbohydrates/100g
Nutrision Protein Plus	125	6.3	14.2
Nutrison	100	4	12.3
Nutrison Energy	150	6	18.3

Feed change

	Feed	Kcal	Protein	Carbohydrates	Carb/hr
Old Feed	Nutrision Protein Plus	1250	63	142	10.65
	Nutrison	500	20	61.5	9.2
New Feed	Nutrison Energy	600	30	91.5	7.68

What are your thoughts?

What we did

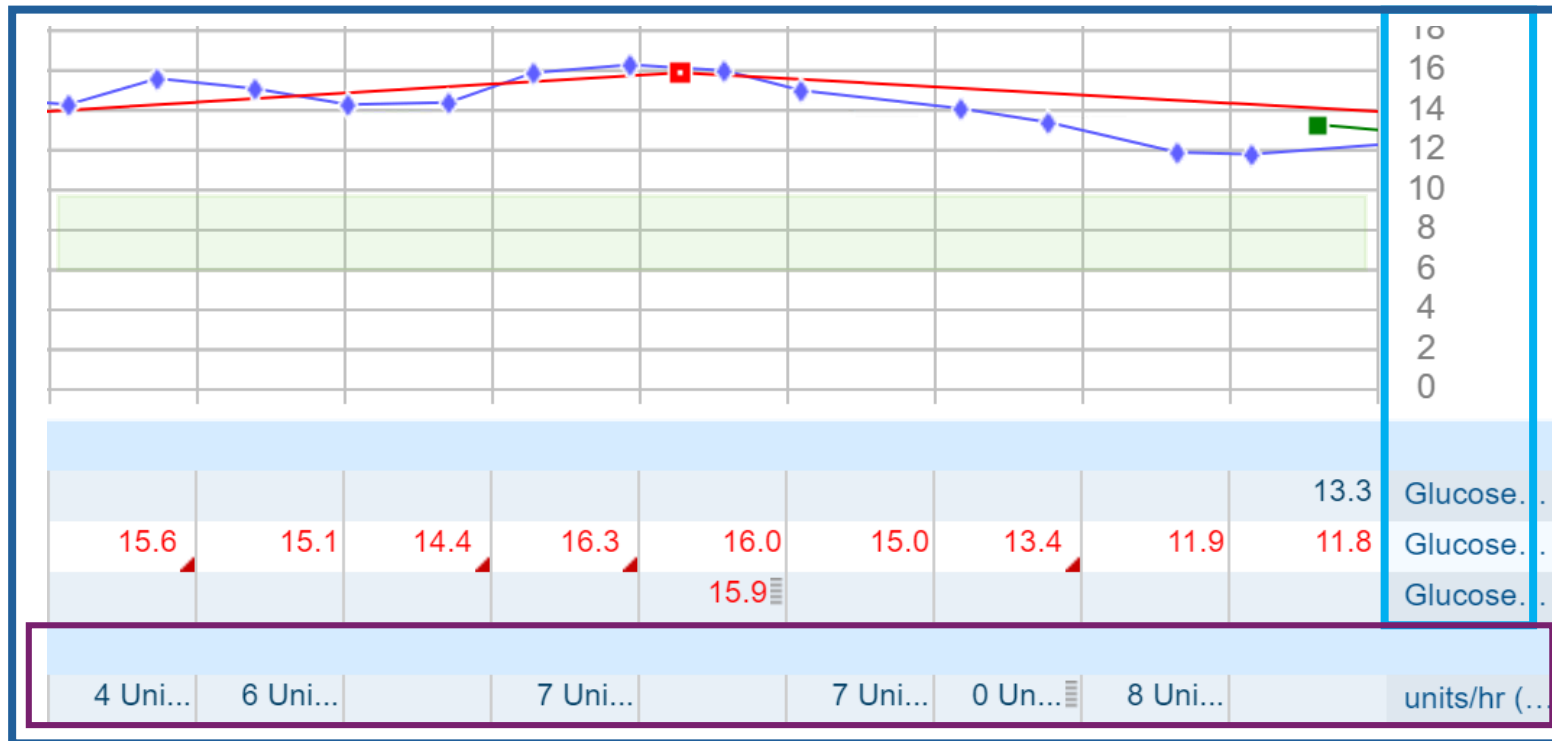
Date	B'fast	Lunch	Dinner (FEED BREA K)	Evening	Overnight	Feed	Insulin (Humulin I)
28/11	8.9	13.7	9.4	4.1	4.4	NE 12 hour (0.5L) 12hr @42mL/hr	48 units am 60 units pm
29/11	3.9	7.5	3.1	7.8		NE 12 hour (0.5L) 12hr @42mL/hr	48 units am 60 units pm
30/11	4.3	10.8	15.8	10.7		NE 12 hour (0.5L) 12hr @42mL/hr	14 units am 60 units pm

2nd December - stop feed

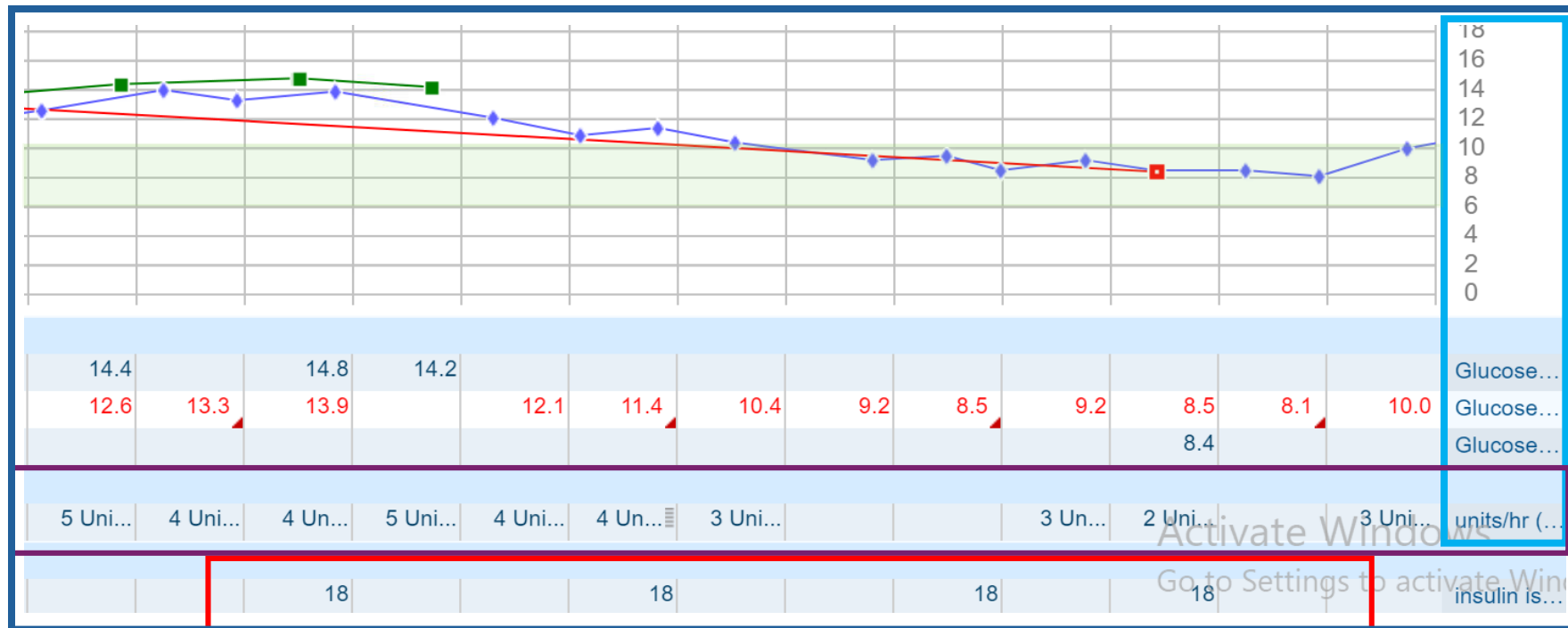
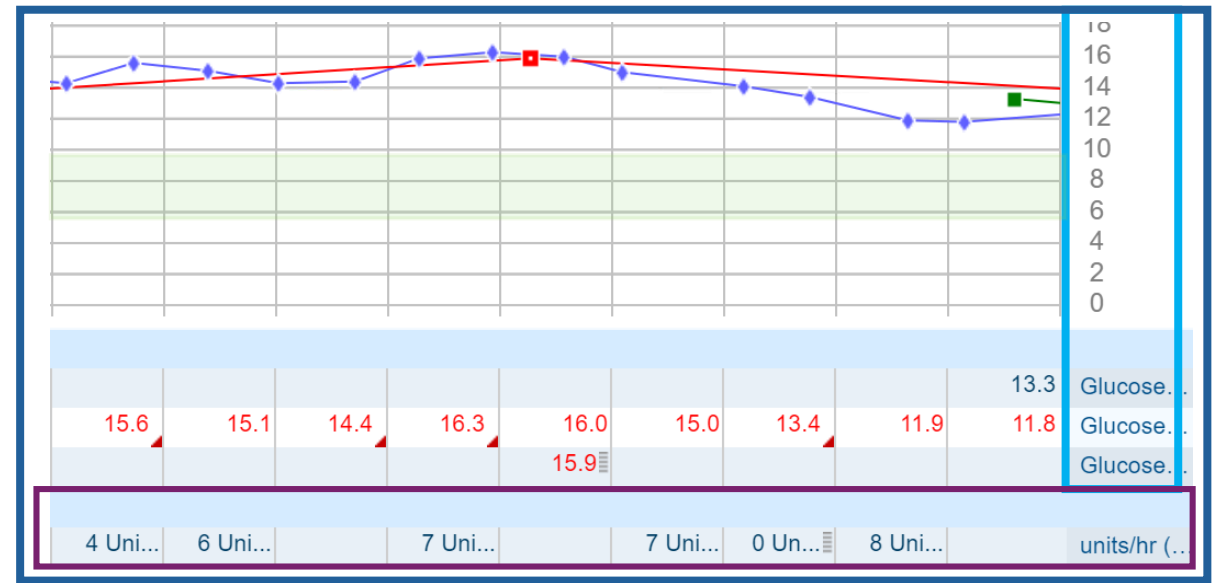
Considerations? Insulin plan?

- Normally, Metformin MR 1g, Dapagliflozin 10mg, Linagliptin 5mg, Lantus OD 28 units

- 59 male
- BMI – 34.9 kg/m²
- No known diabetes
- HbA1c 2022 – 37 mmol/mol
- Creatinine 70, eGFR >90
- Ventriculitis, reduced GCS → Drain
- Nutrison Protein Advance 76ml/hr over 24 hours providing 1824ml, 2335kcal, 137g protein, 281g carb (11.7g/hr)
- Dexamethasone
- High VRIII rates



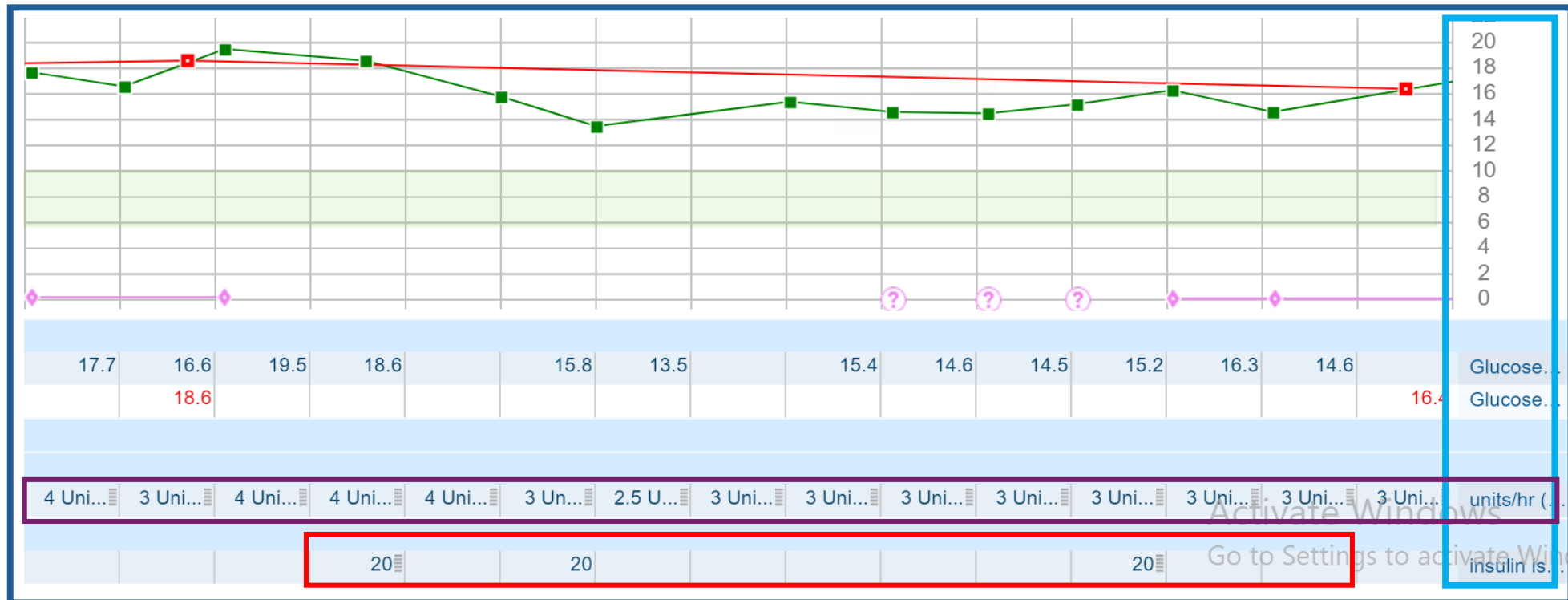
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In 24 hours

- Insulin on VRIII – 80 units
- Basal - 40 Units
- BG – 14-22 mmol/l



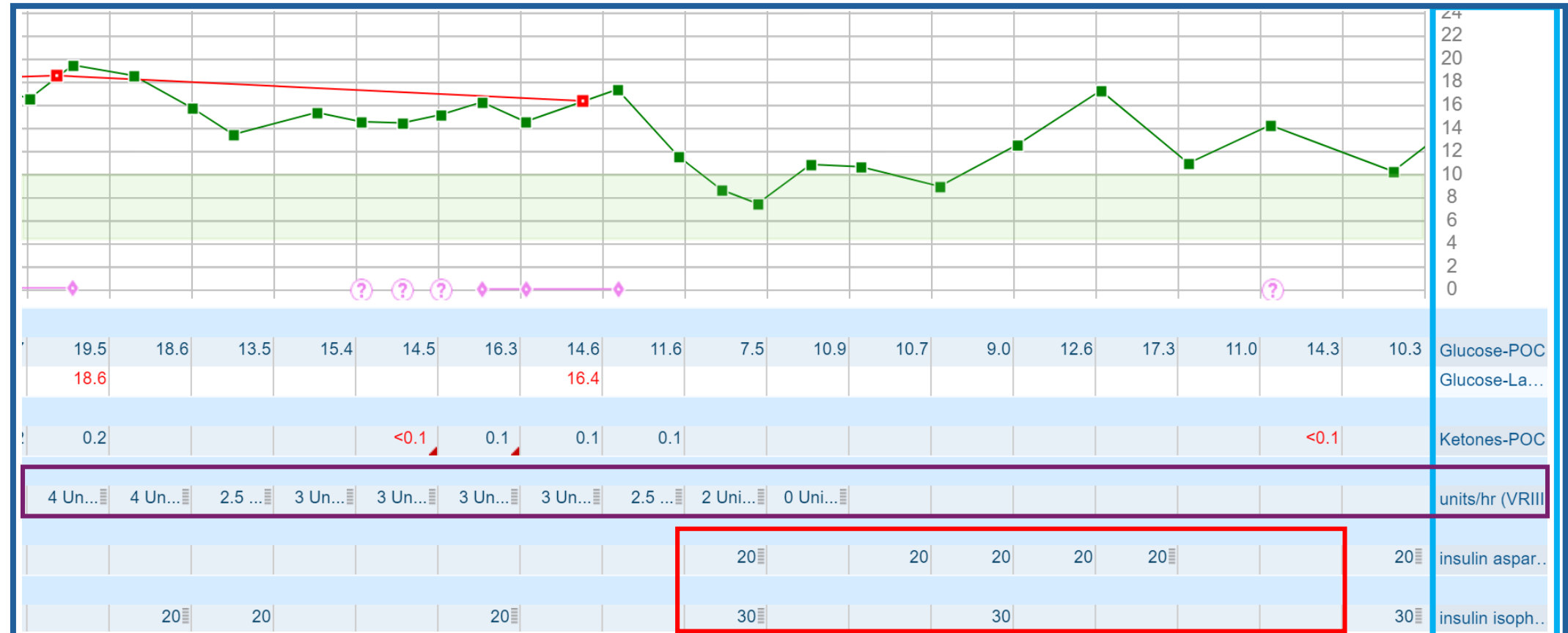
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Transition

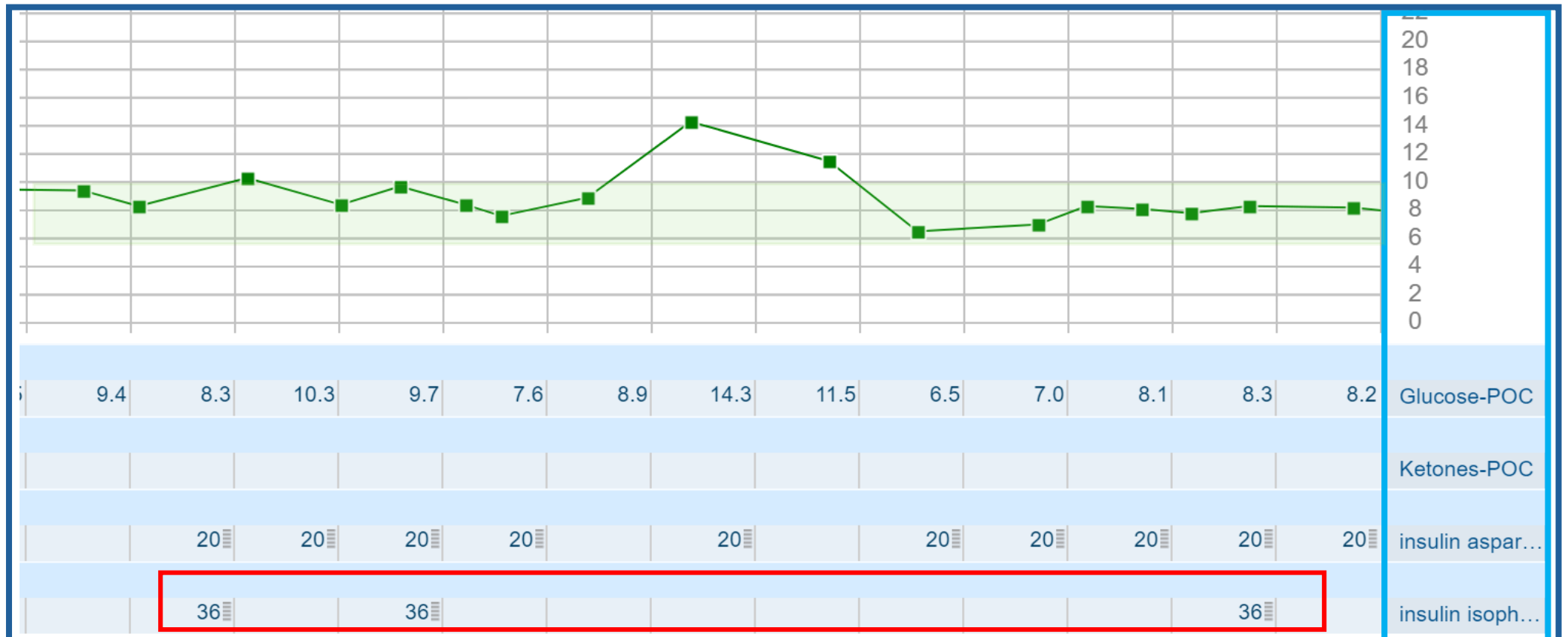
- Basal – 30 + 30 Units
- QA 4hrly – 20 units - 5 doses



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Adjustment

- Basal – 36 + 36 Units
- QA 4hrly – 20 units – 5 doses



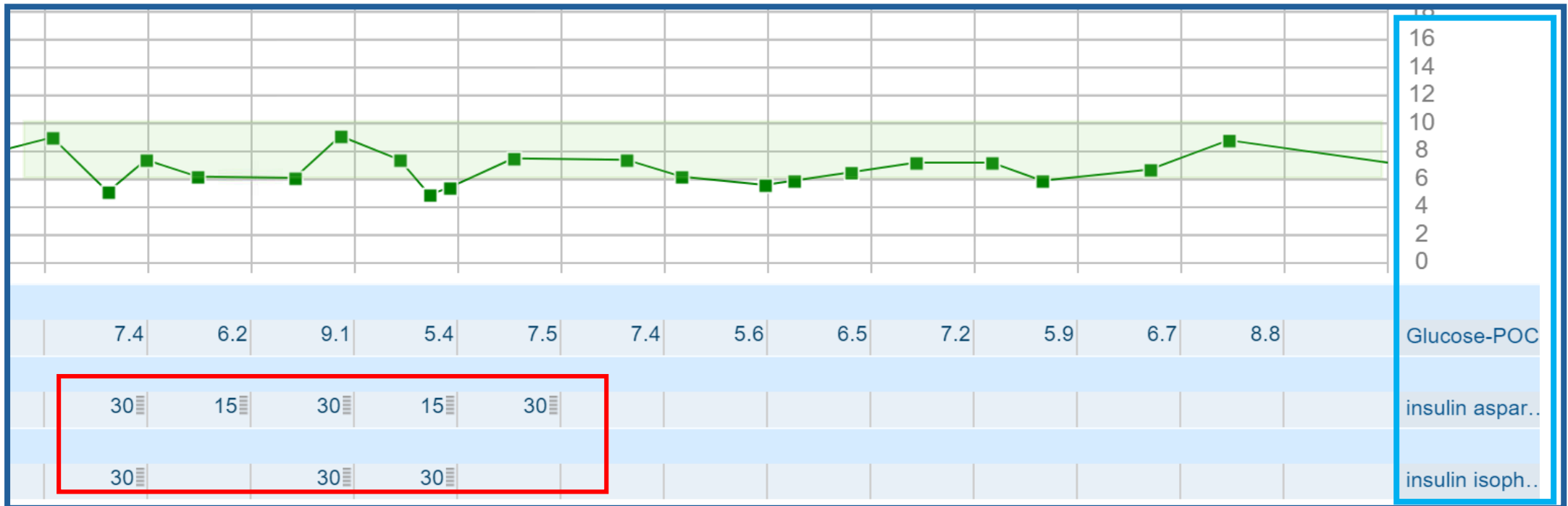
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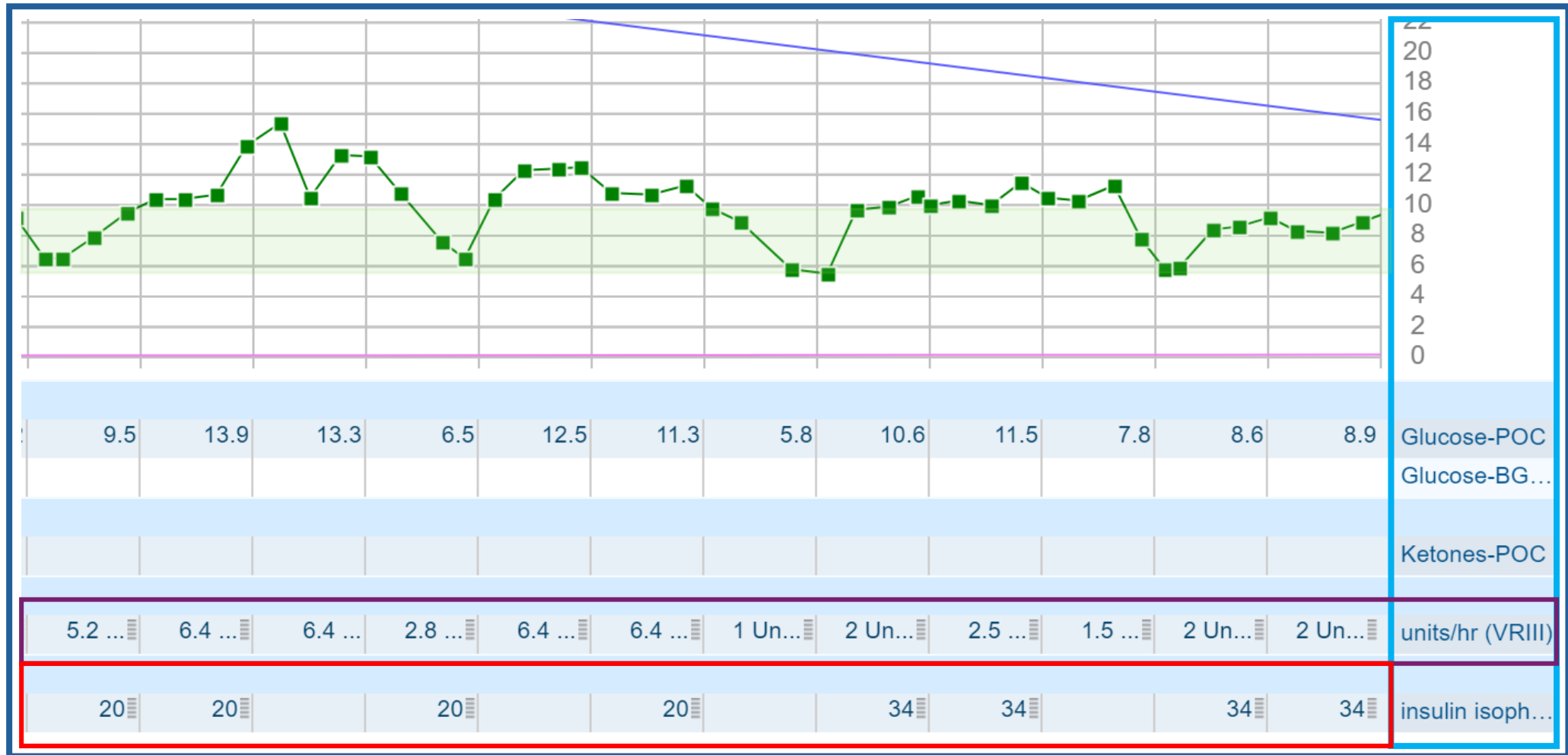
Adjustment

- Basal – 36 + 36 Units
- QA 4hrly – 20 units every 4 hours – 5 doses



High Insulin requirements on VRIII

Basal - 20 Units BD → 34 Units BD



High Insulin requirements on VRIII

Basal - 20 Units BD → 34 Units BD

Pre-mixed – TDS – Start, 7 hours and 14 hours into feed



- 55 year old man
- Necrotising pancreatitis secondary to alcohol excess.
- C-peptide 434
- HbA1c 74mmol/mol
- eGFR >90
- History of ketone production (up to 7.5mmol/L – possibly secondary to alcohol but unknown cause)
- No diabetes medications prior to admission or in situ.

Time	Glucose	Insulin on VRIII
6pm	-	1 unit
7pm	9.9	2 units
8pm	-	2 units
9pm	13.9	4 units
10pm	-	4 units
11pm	5.6	1 unit
12am	-	1 unit
1AM	-	1 unit
2am	-	1 unit
3am	17.9	5 units
4am	-	5 units
5am	9.1	2 units
6am	-	2 units
Total		31 units over 13 hours

VRIII/feed

- 5% glucose alongside feed on VRIII
- Current NG plan: 1000ml Peptisorb Plus HEHP @ 83ml/hr for 12hrs = 1500kcal, 75g pro and 187g CHO.
- Pancrex V powder 2g 4hrly alongside feed.

New feed plan:

- Change NG feed to 20hour feed - 1200ml Peptisorb plus HEHP @ 60ml/hr x 20hours = 1800kcal, 90g pro, 224g CHO.

Feed composition

	Feed	Rate mL/hr	Duration	Carbohydrates	Carb/hr
Old Feed	Peptisorb Plus HEHP	83	12	187	15.58
New Feed	Peptisorb Plus HEHP	60	20	224	11.2

What are your thoughts?

What we did

- 31 units required on VRIII
- Carbohydrate/hr overnight reducing 28%.
- 5% glucose contributing 22% of total carbohydrate load
- Therefore,
- $31 \text{ units} - 28\% - 22\% = 15.5 \text{ units overnight}$
- Day time complete unknown. Therefore, apply a rule of thirds to morning dose.

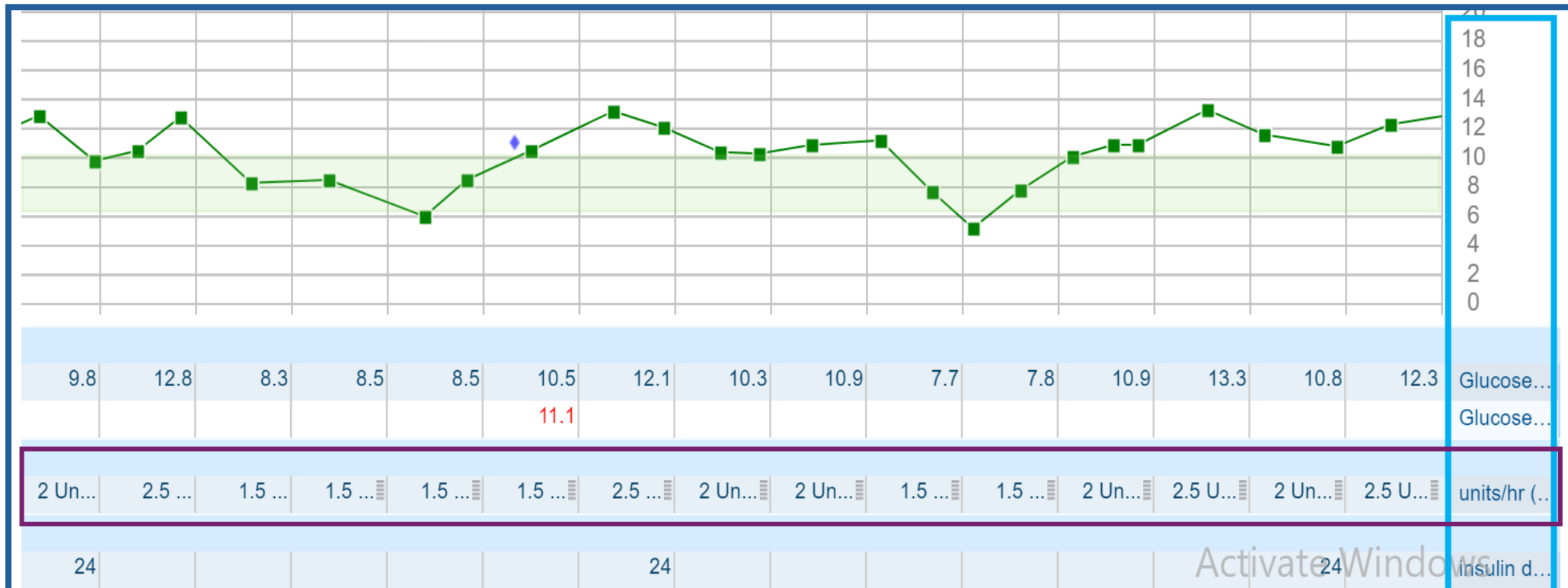
What we did

- Start Lantus 8 units as obligatory background dose secondary to C-peptide.
- Start 8 units morning and 14 units Humulin I with start of feed (first dose that evening).
- Stop VRIII after Lantus dose.

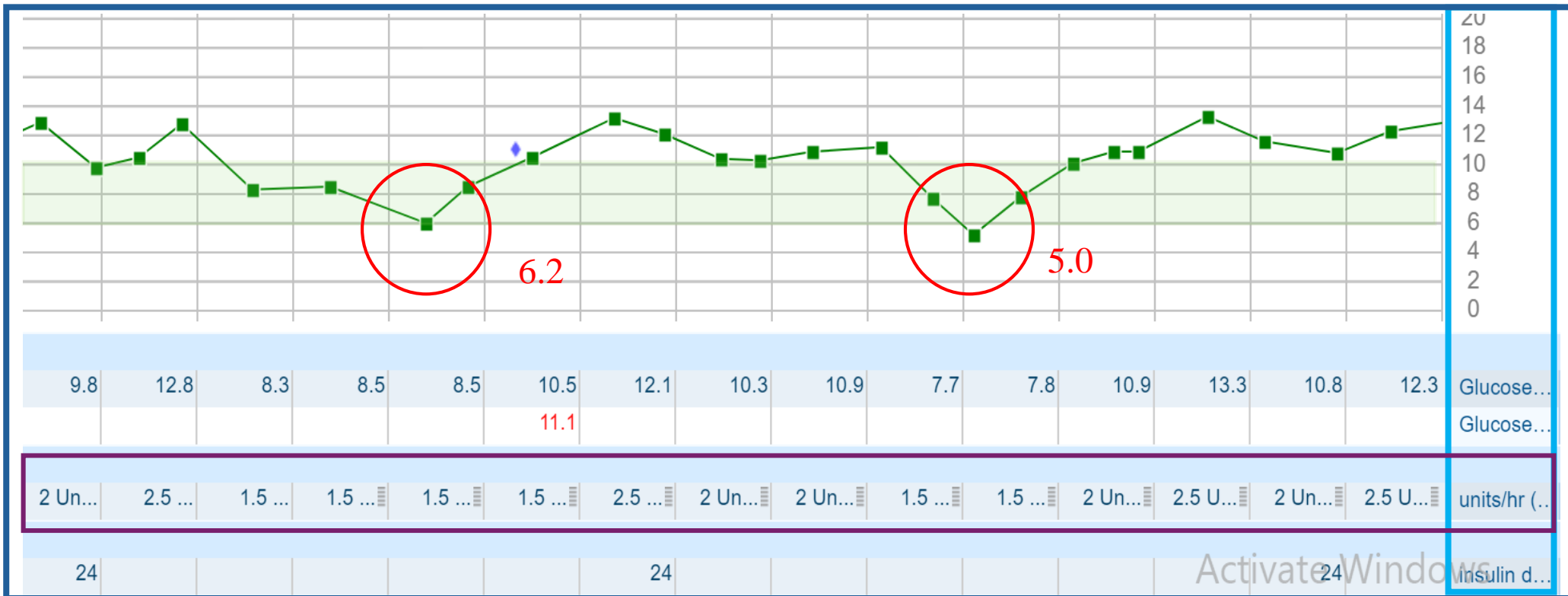
Outcome

Time	Glucose
Time of review	13.6
6pm	8.4
9pm	12.2
6am	11.4
11am	13.7
5pm	8.8
9pm	11.1

- 58 male
- BMI – 26.6 kg/m²
- T1DM – 28 units Tresiba + QA
- HbA1c – 90 -110 mmol/mol
- Creatinine 88, eGFR 84
- SAH + IVH
- 1900ml Nutrison Protein Plus Multifibre @95ml/hr x 20hrs (2432kcal, 119g protein, 267.9g CHO (13.39g CHO/hr))



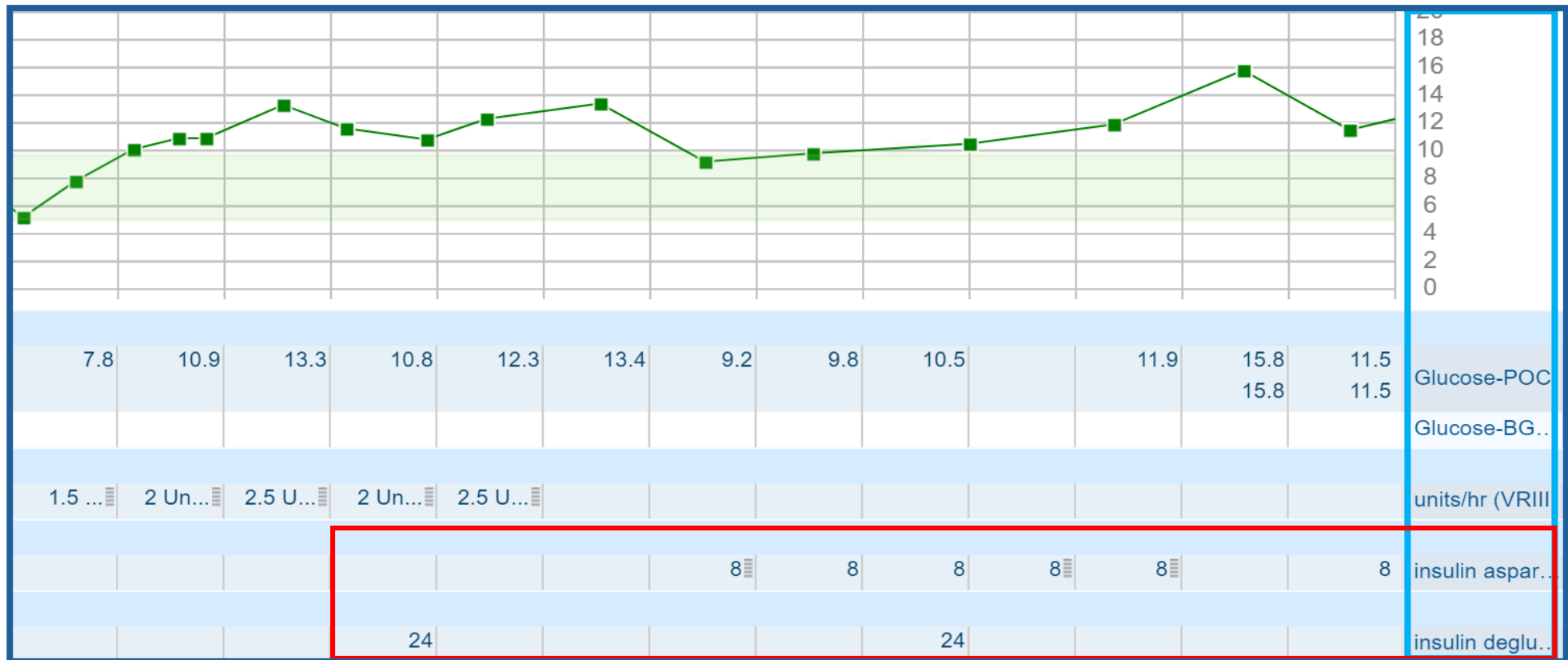
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Transition:

- Basal – 24 units
- QA – 8 units every 4 hours x 5 doses

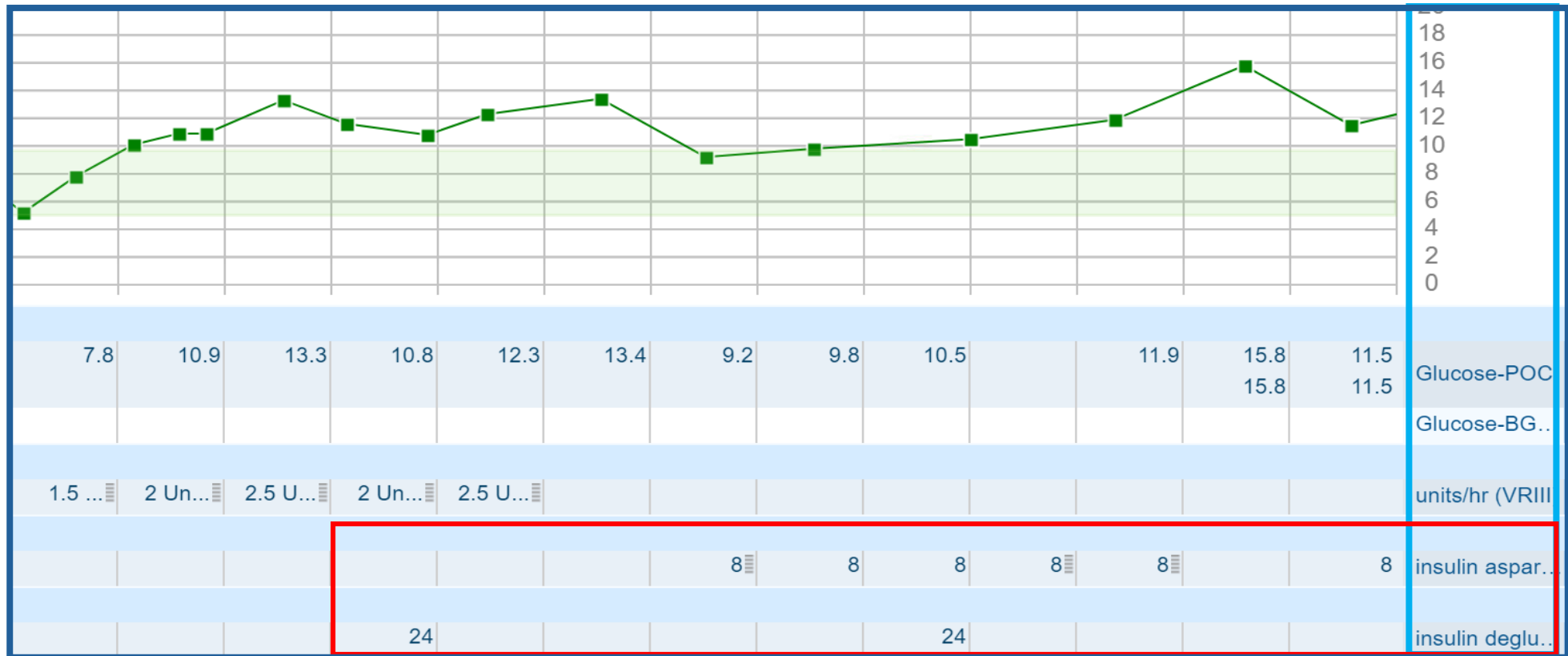


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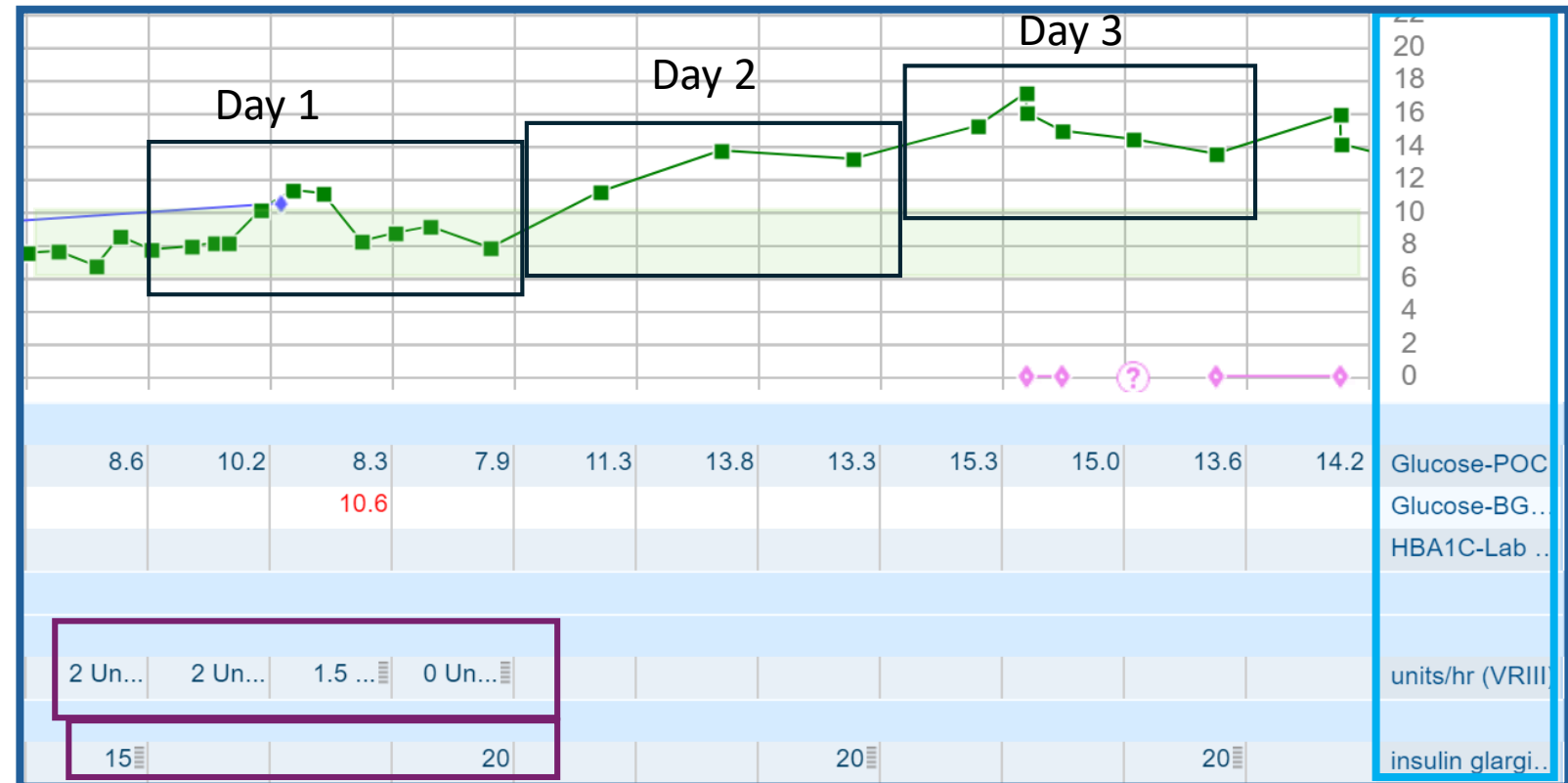
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Feed pump low battery



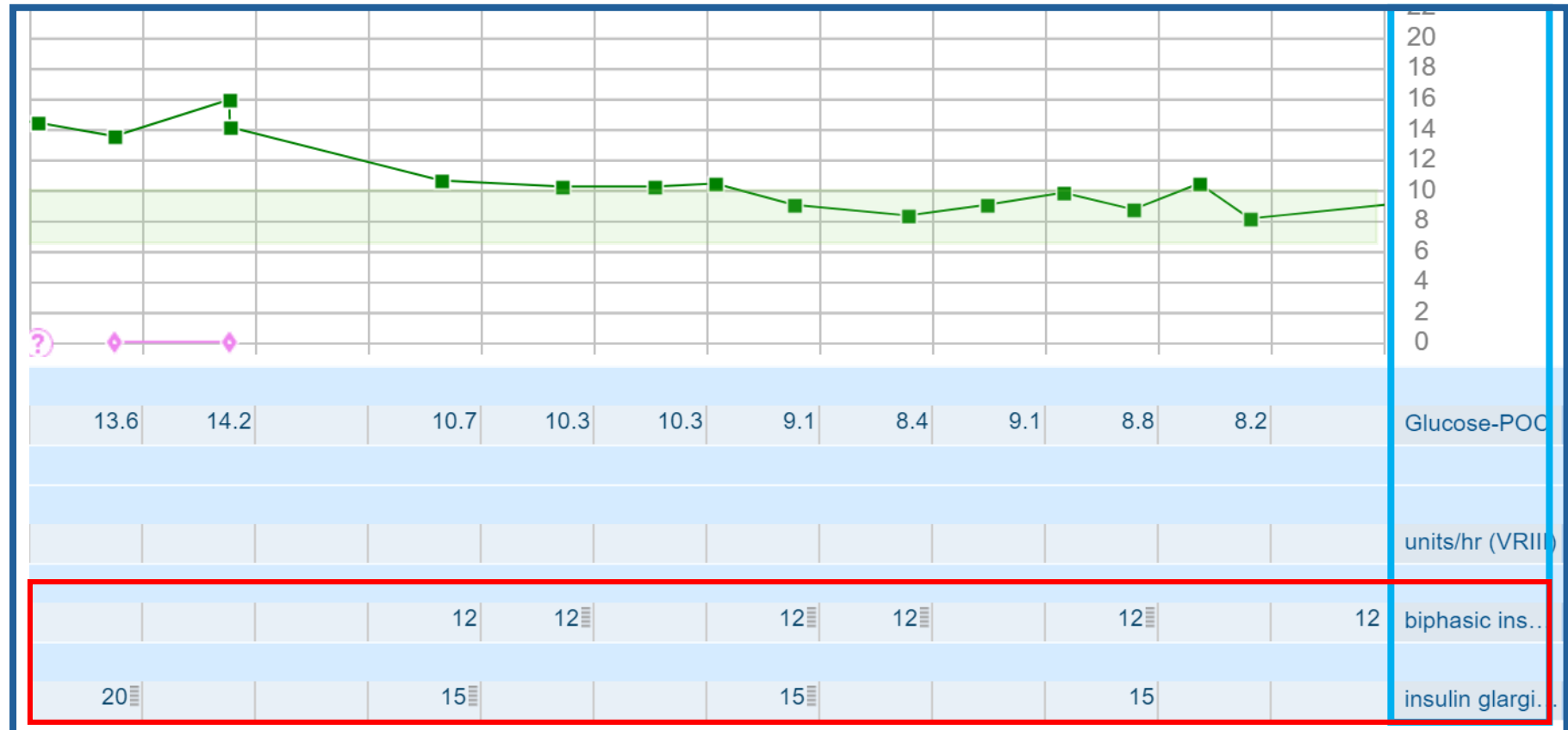
- 57 male
- BMI – 31.9 kg/m²
- New T3cDM – Chr pancreatitis, SMV thrombosis
- O/A Glu – 30.2 mmol/l Ketones 2.3 mmol/l
- HbA1c – 103 mmol/mol

- VRIII + basal
- Ileal ischaemia – gut rest
- 24 hour PN started
 - Day 1 – 113g CHO
 - Day 2 – 189g CHO
 - Day 3 – 270g CHO



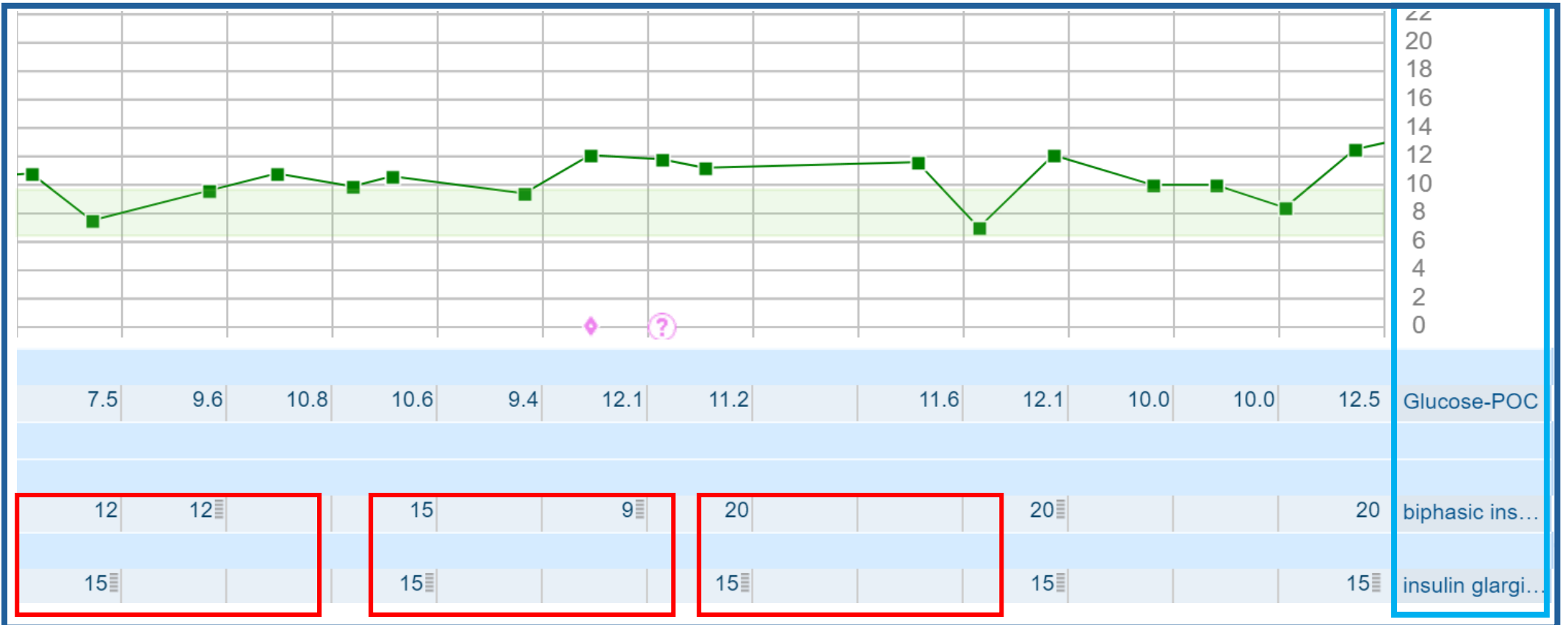
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- 24- hour PN - 270 g CHO

- Basal 20 → 15 units
- TDD – 1:10 g – 27 units
- -10% for basal excess
- BD mixed



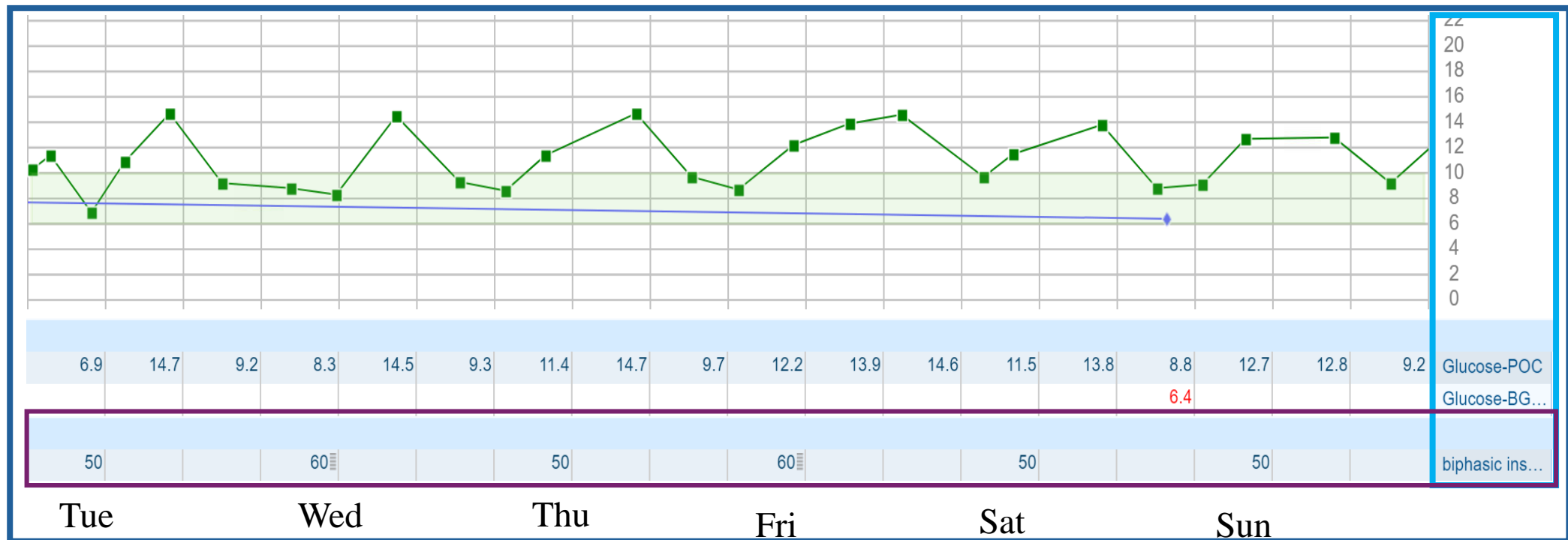
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220g	Duration
Day 1	24 hours
Day 2	18 hours
Day 3	12 hours



- 71 male
- BMI – 25.9 kg/m²
- On HPN since 2019
- Type 2 IF resection of necrotic intestines
- On Home PN

	Lipid (Mon,Wed,Fri)	Aqueous
CHO g	250 g	250 g
Lipid (Kcals)	700	0
Duration	14 hours	13 hours

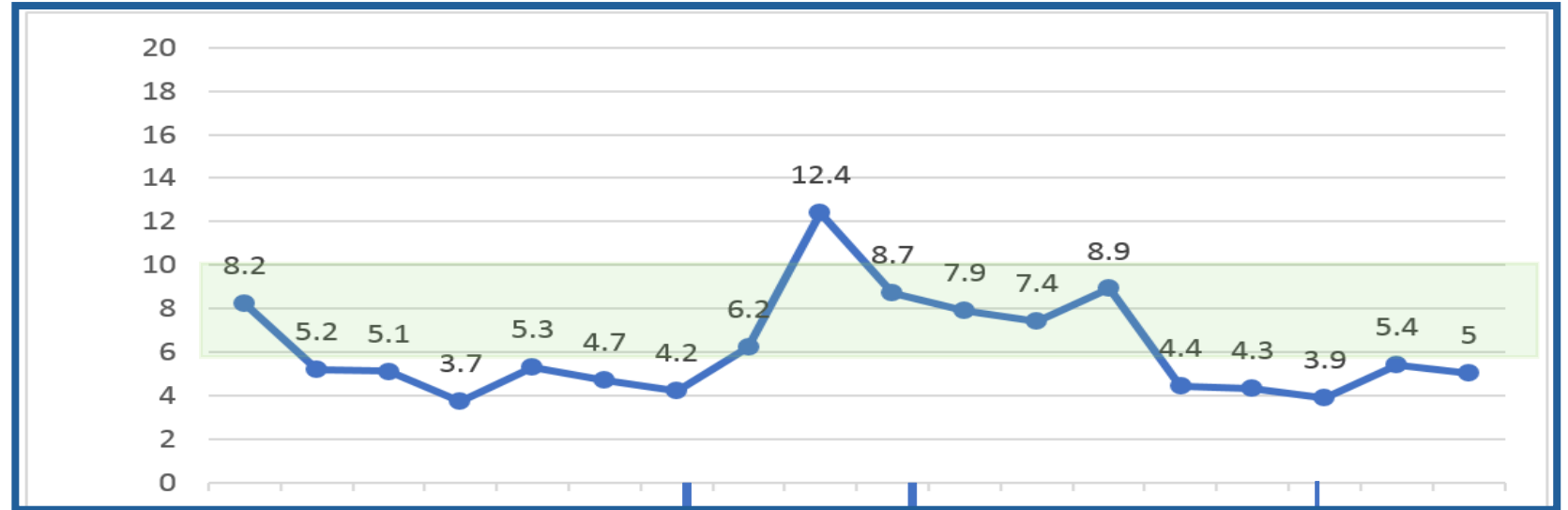


Continuous feed:

Any insulin with a basal component 12 hourly

Intermittent feeding:

“front loading” with rapid acting insulin or a pre-mixed insulin



Start of PN:
Basal : 26 units
Rapid : 33 units

4 hours into PN:
Rapid : 25 units

End of feed

- 65 female
- BMI – 34.5 kg/m²
- Short gut and enterocolic fistula, Whipple's
- On HPN 12 hours – 250g CHO
- 112 units 50/50 premixed at start

Transferred to isolation on non-parent ward
 PN bag burst soon after started
 Severe hypoglycaemia after 2 hours



- Be aware of your insulin profiles – use that knowledge to optimise
- Choose based on profile and feed – use whatever insulin fits best with needs
 - Cover for full feed, think about insulin stacking
 - Reduce single injection dose
 - Reduce injection burden

High insulin requirements

- Transition with basal buffering
- Think MDI options
- Think what will you advice re: feed stops/interruptions

Think about the glucose profile

- Long duration feeds – any flat insulin
- Shorter feeds especially PN, early glucose spike – think some QA dosing
- Lipid vs aqueous PN

Tips and practical suggestions

Be aware of your feed composition – calculate hourly carb rates especially when calculating change

If you have VRIII info – use it

Adjust TDD calculations from VRIII on factors such as:

- BG on VRII
- Clinical glucose target
- Non-feed insulin requirements – T1/T3c, pre-admission insulin
- Renal function/steroid etc

Factor in limitations and strengths of ward

Factor in feed timing especially when going home