East and North Hertfordshire NHS
NHS Trust

ENHIDE

East and North Herts Institute of
Diabetes and Endocrinology

Prevention of Hypoglycaemia

Dr Andrew Solomon

Consultant in Diabetes and Endocrinology ENHT

- Hertfordshire Diabetes Conference
- 6th October 2016
- Fielder Centre, Hatfield, Herts.

Does it matter?

- Ok to have a glucose of 1.8 once in a while?
- Ok to have a glucose of 2.8 “ “ “
- Ok to have a glucose of 3.8 “ “ “
- Ok to have a glucose of 4.8 “ “ “

The Latest NICE Guidance for Type 1 and Type 2

Hypo prevention Type 2 NICE
Type 2 diabetes in adults: management
NICE guideline [NG28] Published date: December 2015 Last updated: July 2016

- “Reducing the risk of hypoglycaemia should be a particular aim for a person using insulin or an insulin secretagogue”
- “…if…drug not associated with hypoglycaemia, support the person to aim for an HbA1c level of 48 mmol/mol (6.5%). For adults on a drug associated with hypoglycaemia, support the person to aim for an HbA1c level of 53 mmol/mol (7.0%)”

Type 2 NICE

- “Consider relaxing the target HbA1c level…….[in] people who are at risk of falling, people who have impaired awareness of hypoglycaemia, and people who drive or operate machinery as part of their job”
- “Consider pre-mixed (biphasic) preparations that include short-acting insulin analogues, rather than pre-mixed (biphasic) preparations that include short-acting human insulin preparations, if: a person prefers injecting insulin immediately before a meal **or** hypoglycaemia is a problem ”

Type 2 NICE

- “Consider switching to insulin detemir or insulin glargine from NPH insulin in adults with type 2 diabetes: who do not reach their target HbA1c because of significant hypoglycaemia **or** who experience significant hypoglycaemia on NPH insulin irrespective of the level of HbA1c reached”

Hypo prevention Type 1 NICE
Type 1 diabetes in adults: management
NICE guideline [NG17] Published date: August 2015 Last updated: July 2016

- https://www.nice.org.uk/guidance/ng17/chapter/1-Recommendations
- 1.10.13If hypoglycaemia becomes unusually problematic or of increased frequency, review the following possible contributory causes:
- inappropriate insulin regimens (incorrect dose distributions and insulin types)
- meal and activity patterns, including alcohol
- injection technique and skills, including insulin resuspension if necessary
- injection site problems
- possible organic causes including gastroparesis
- changes in insulin sensitivity (including drugs affecting the renin–angiotensin system and renal failure)
- psychological problems
- previous physical activity
- lack of appropriate knowledge and skills for self-management.

Type 1 NICE
Hypoglycaemia ;assessment; and awareness

- if there is a need to know blood glucose levels more than 4 times a day for other reasons (for example, impaired awareness of hypoglycaemia, high-risk activities)
- **Identifying and quantifying impaired awareness of hypoglycaemia**
- 1.10.1Assess awareness of hypoglycaemia in adults with type 1 diabetes at each annual review. **[new 2015]**
- *1.10.2 Use the Gold score or Clarke score to quantify awareness of hypoglycaemia in adults with type 1 diabetes, checking that the questionnaire items have been answered correctly.* ***[new 2015]***

Type 1 NICE
Hypoglycaemia :Management

Review insulin regimens and doses and prioritise strategies to avoid hypoglycaemia in adults with type 1 diabetes with impaired awareness of hypoglycaemia, including:

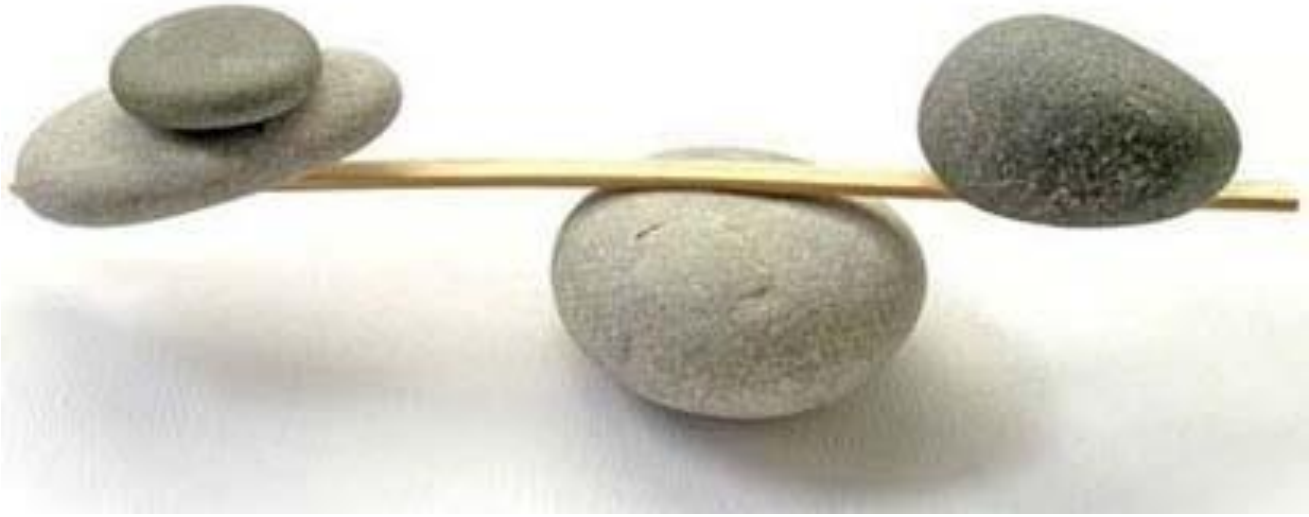
- reinforcing the principles of structured education
- offering continuous subcutaneous insulin infusion (CSII or insulin pump) therapy
- offering real-time continuous glucose monitoring. **[new 2015]**

- *"Consider real-time continuous glucose monitoring for adults with type 1 diabetes who are willing to commit to using it at least 70% of the time and to calibrate it as needed, and who have any of the following despite optimised use of insulin therapy and conventional blood glucose monitoring:*
- *More than 1 episode a year of severe hypoglycaemia with no obviously preventable precipitating cause.*
- *Complete loss of awareness of hypoglycaemia.*
- *Frequent (more than 2 episodes a week) asymptomatic hypoglycaemia that is causing problems with daily activities.*
- *Extreme fear of hypoglycaemia."*

Type 1 NICE
Hypoglycaemia :Management

- 1.9 Referral for islet or pancreas transplantation
- 1.9.1Consider referring adults with type 1 diabetes who have recurrent severe hypoglycaemia that has not responded to other treatments (see section 1.10) to a centre that assesses people for islet and/or pancreas transplantation. **[new 2015]**

..Balance..



Balance of Medication Efficacy and Safety

- Ideally
- -Glucose lowering effect
- -Absence of hypoglycaemic effect
- -Improved lipid/metabolic status
- -Improved CVS event profile

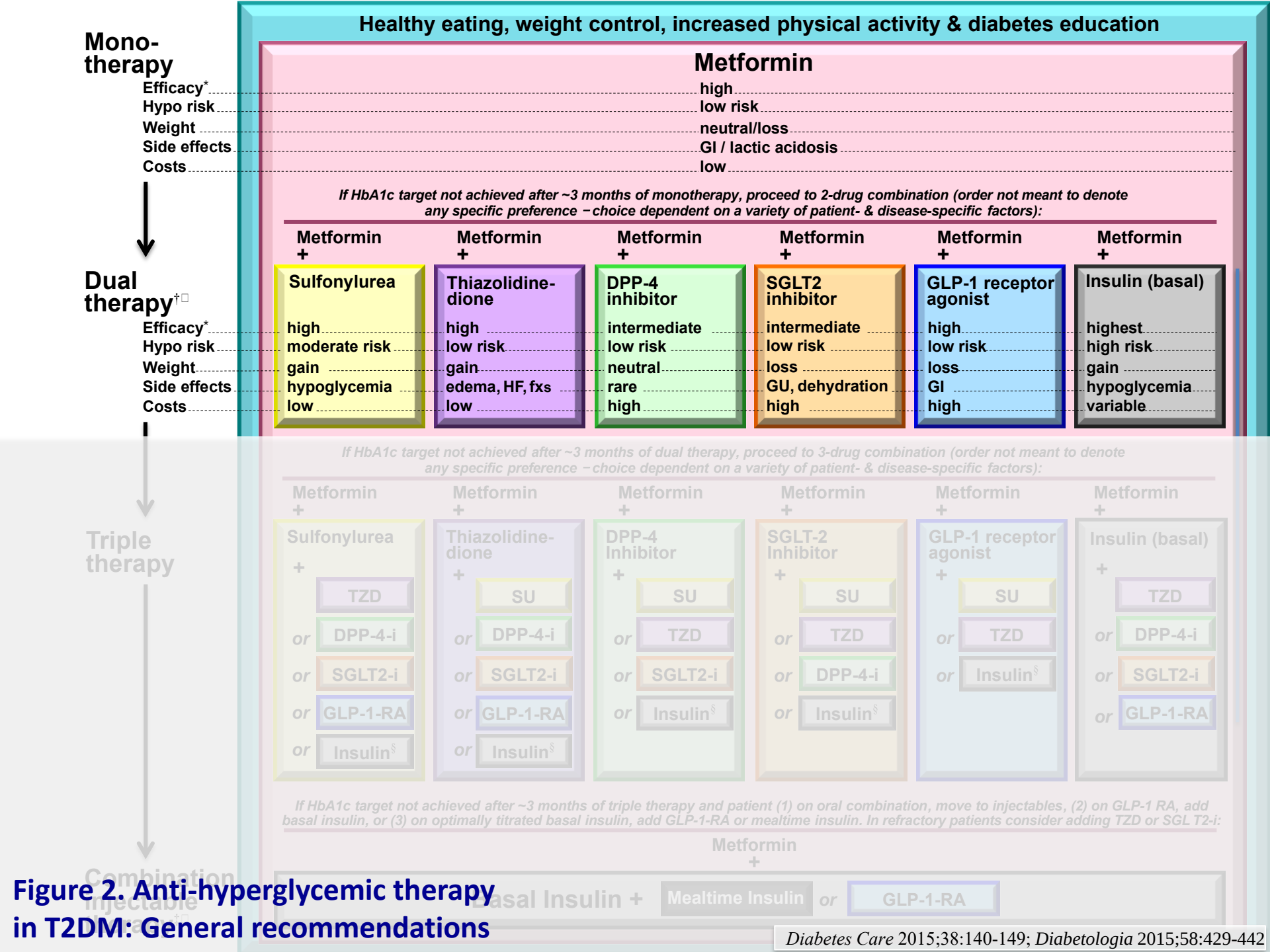


Figure 2. Anti-hyperglycemic therapy in T2DM: General recommendations

Diabetes Care 2015;38:140-149; *Diabetologia* 2015;58:429-442

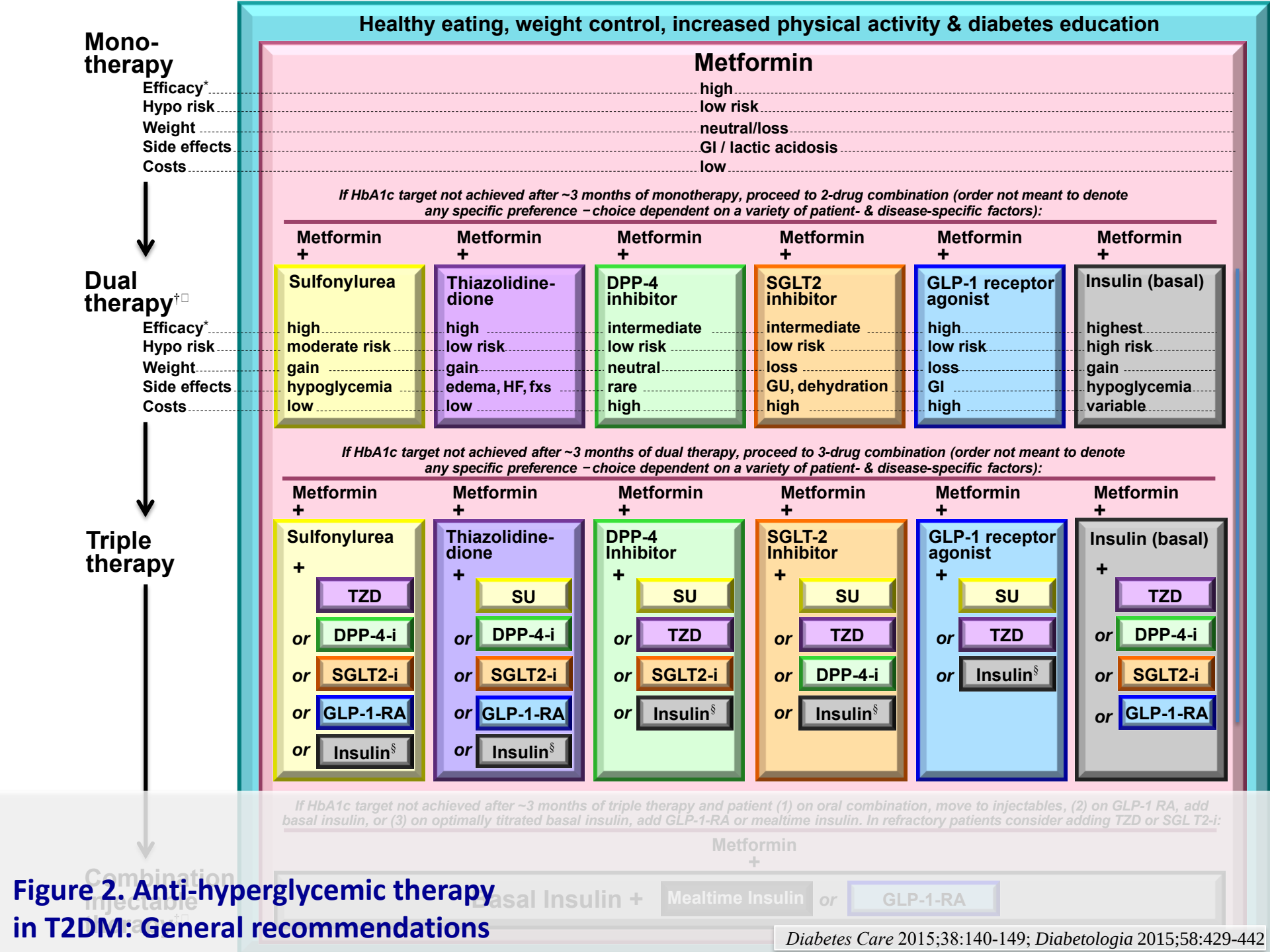
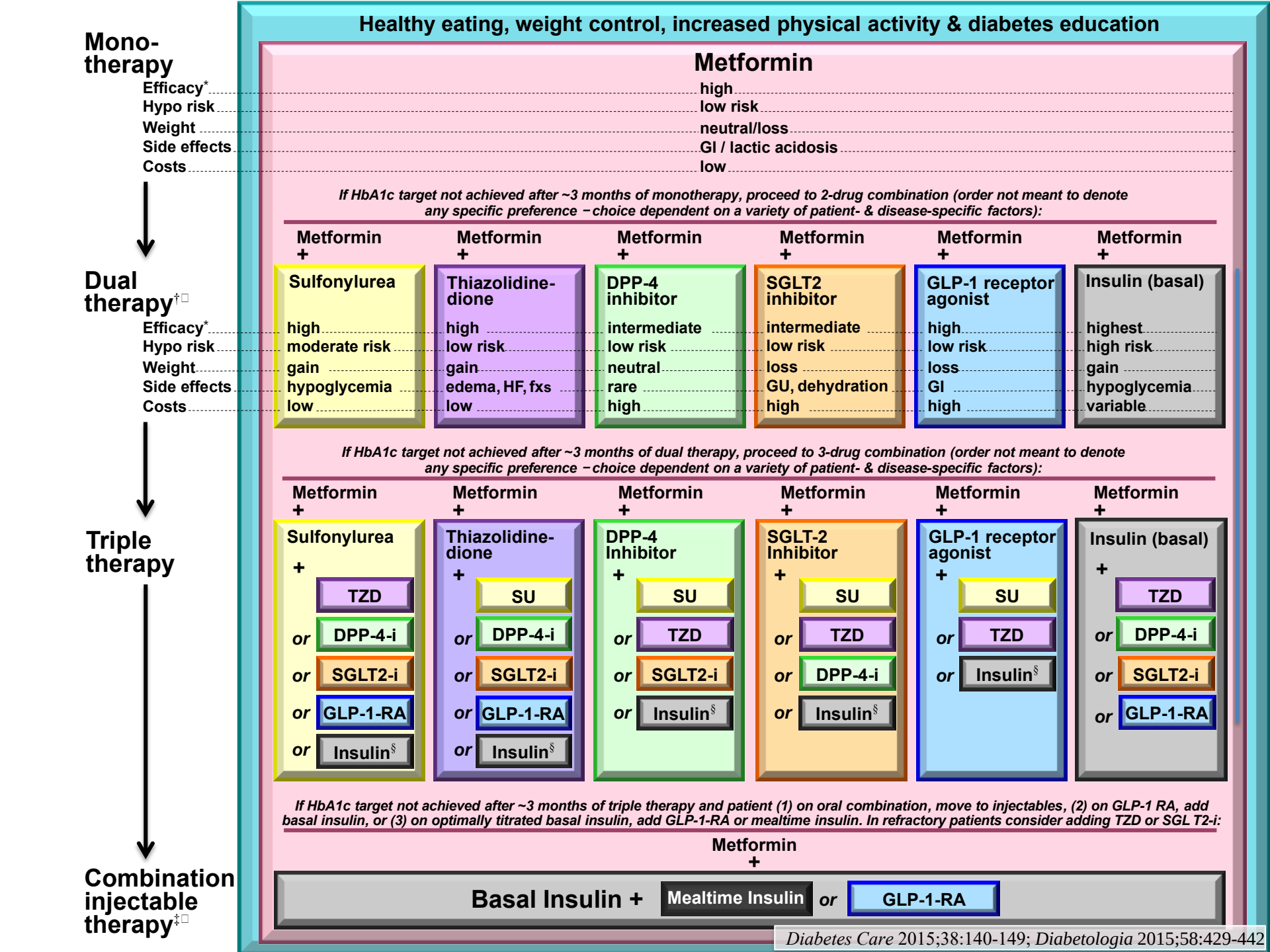
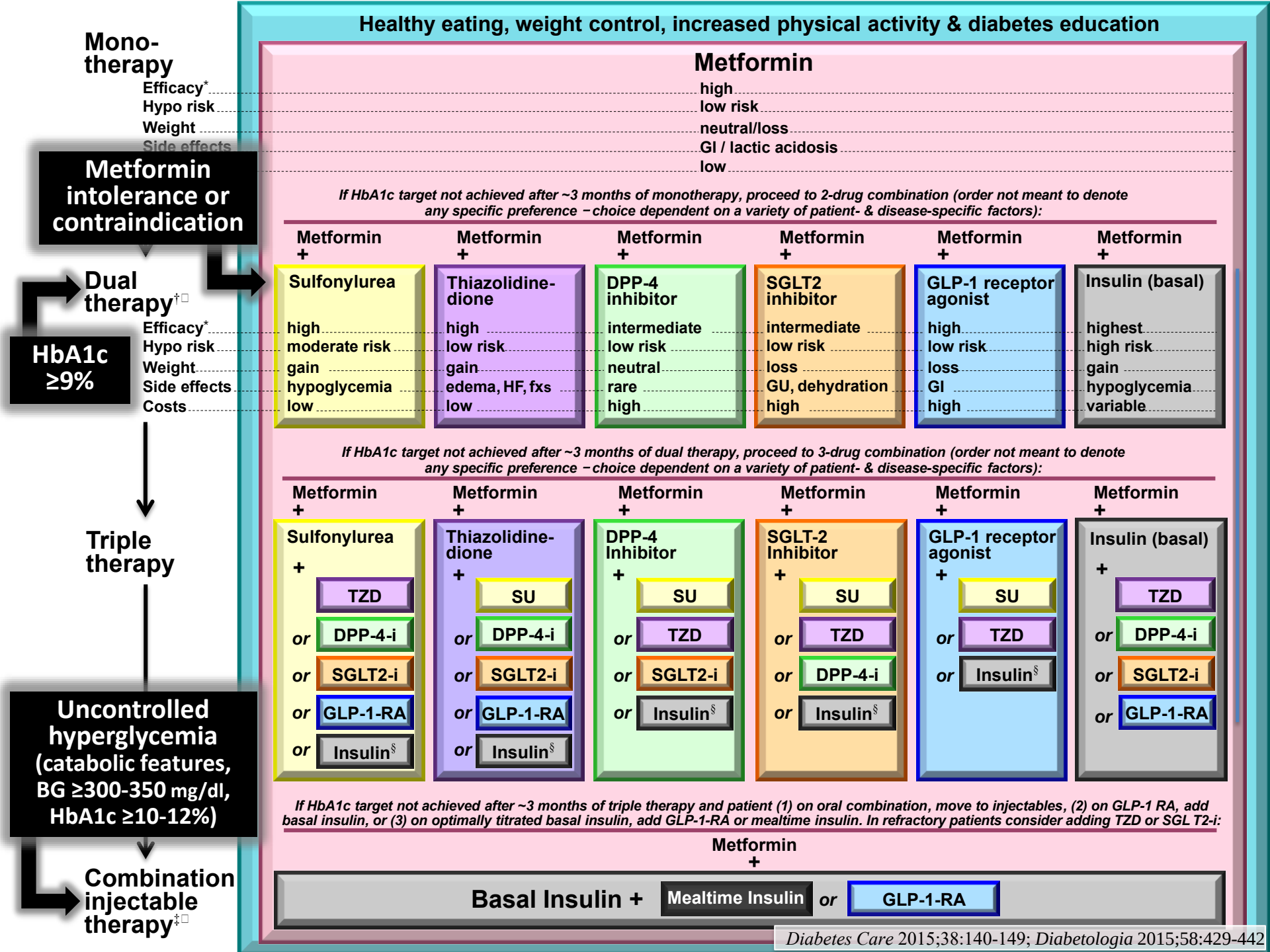


Figure 2. Anti-hyperglycemic therapy in T2DM: General recommendations

Diabetes Care 2015;38:140-149; *Diabetologia* 2015;58:429-442



Diabetes Care 2015;38:140-149; *Diabetologia* 2015;58:429-442



Diabetes Care 2015;38:140-149; *Diabetologia* 2015;58:429-442

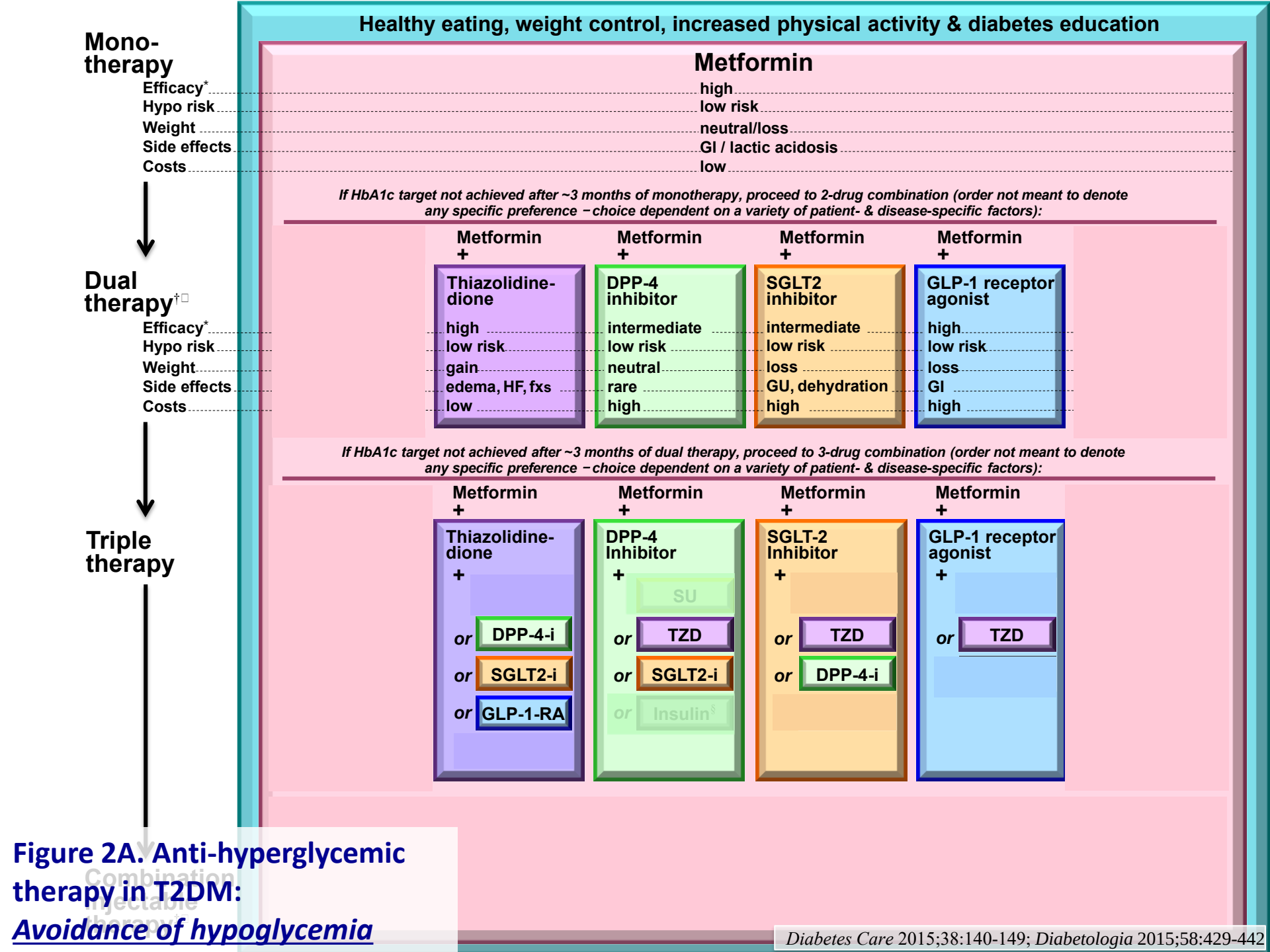
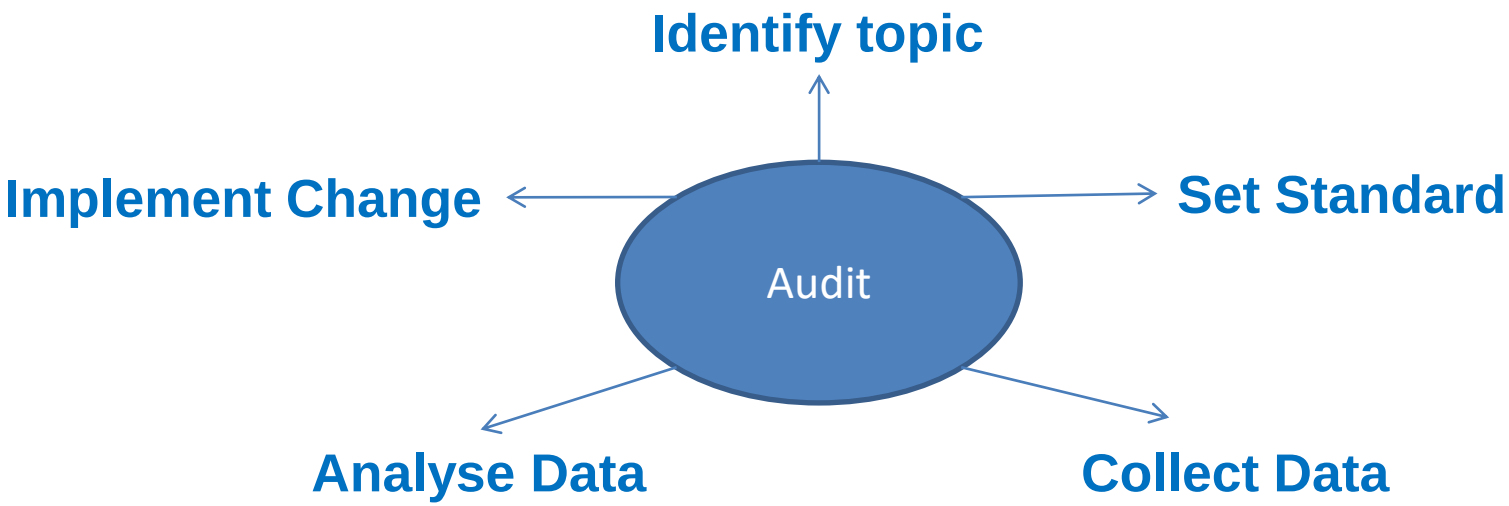


Figure 2A. Anti-hyperglycemic therapy in T2DM: *Avoidance of hypoglycemia*

Diabetes Care 2015;38:140-149; *Diabetologia* 2015;58:429-442

Re-Audit of Severe Acute Hypoglycaemic Admissions in A & E



Presented by: Karen Moore-Haines & Sarah Woodley.

Lister 19/05/2016

Background

- Previous audit undertaken in 2014 by Dr Julia Prague, Dr Andrew Solomon and Dr Stella George.
- Looked at all A&E attendences coded as hypoglycaemia during a 3 month period.
- A limitation was that it only captured presentations that had a discharge summary created.
- The re-audit was expanded to include a wide array of 33 data points for patients admitted in association with a hypoglycaemic episode (from hypo to discharged)
- The re-audit started collecting data from March through to September 2015 and the initial cohort was 63 patients. However due to the usual constraints of obtaining notes, the audit managed to look at 38 patients notes in greater detail.

Aims

- Compare the results of the re-audit to the previous audit
- Characterise in more detail clinical features of patients presenting who had hypoglycemia
- Find trends and patterns of admissions details for those patients admitted
- Fit the data from the patients admitted with hypoglycemia into the wider demographics and informatics of the EAHSN data
- Find possible proposals as a result of the re-audit for lasting change to enable better care for patients who arrive and/or are admitted with hypoglycemia

Standards

- Relate the larger audit data to the published JBDS gold standards for managing hypoglycemia
- Assess awareness of hypoglycaemia in adults with type 1 diabetes at each annual review (NG17)
- Use the Gold score or Clarke score to quantify awareness of hypoglycaemia in adults with type 1 diabetes
- Explain to adults with type 1 diabetes that impaired awareness of the symptoms of plasma glucose levels below 3 mmol/litre is associated with a significantly increased risk of severe hypoglycaemia
- Any locally agreed best practice – Hypo Treatment Pathway

Methodology

Sample

- Identify list of patients who have come into A & E with a diagnosis of ‘Hypoglycaemia’ on BIMS

Data Collection

- All patients were included in the audit which were identified on BIMS between the date 1st March 2015 – 30th September 2015 (7 month period)
- Identify list of patients admitted to the hospital via the Information team to ascertain ‘coding’ on discharge.

Results

Pre Hospital Information (n=38)

How was the patient conveyed to hospital?

Ambulance	27	(71%)
Self Presented	10	(26%)
Blank	1	(3%)

Patient admitted from?

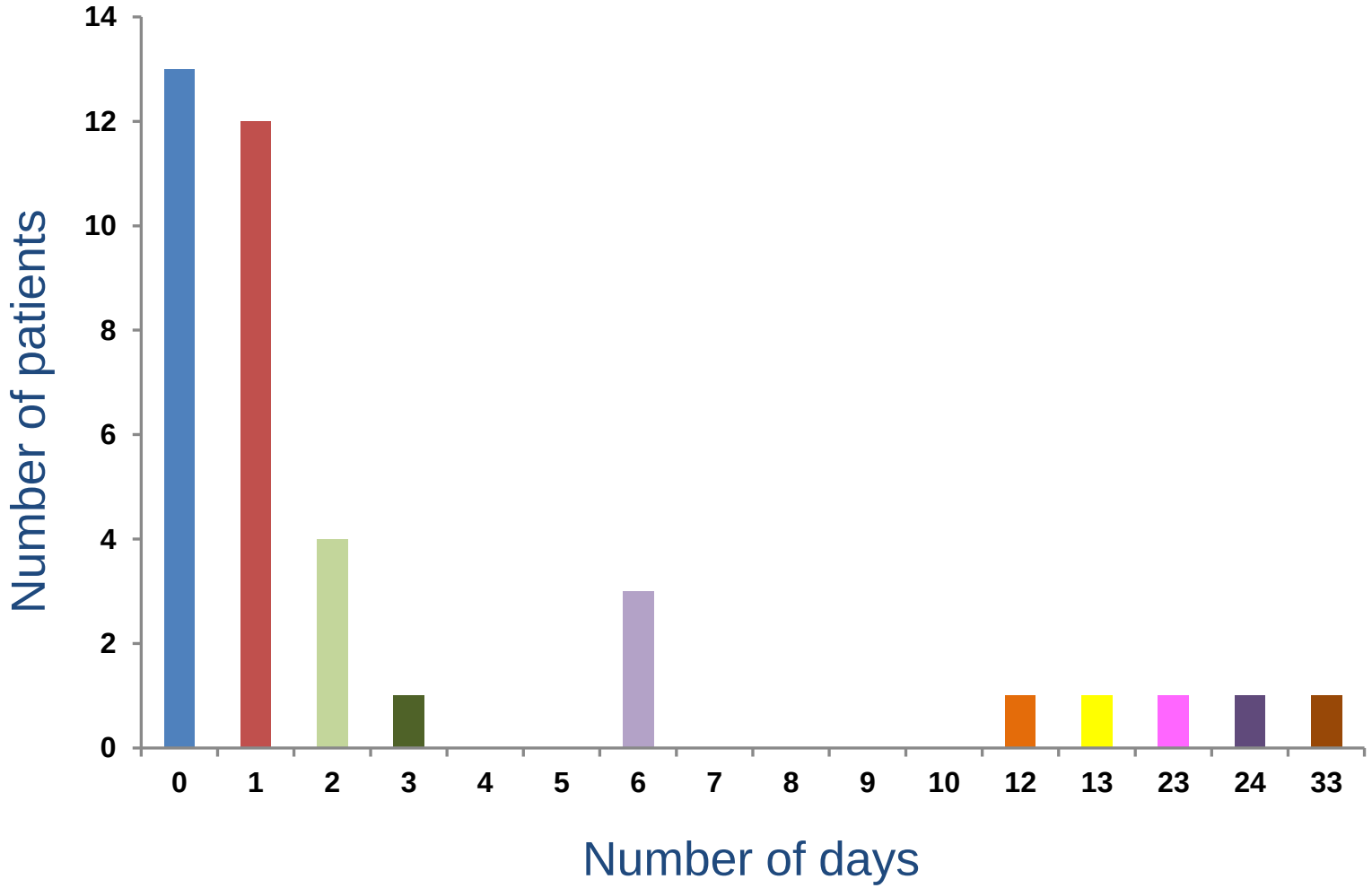
Home	27	(71%)
Residential/Nursing Home	7	(18%)
Other	4	(11%)

Age and Gender (n=38)

	Re Audit (n=38)	%	EAHSN Project (n=203)	%
Less than 10yrs	6	**16%**	1	0.5%
10yrs – 19yrs	1	3%	3	1.5%
20yrs – 29yrs	2	5%	18	9%
30yrs – 39yrs	3	8%	13	6%
40yrs – 49yrs	1	3%	35	**17%**
50yrs – 59yrs	5	13%	20	10%
60yrs – 69yrs	4	11%	32	16%
70yr and over	16	**42%**	81	**40%**

	Re Audit (n=38)	%	EAHSN Project (n=203)	%
Male	15	39%	127	**63%**
Female	23	**61%**	76	37%

Length of stay (n=38)

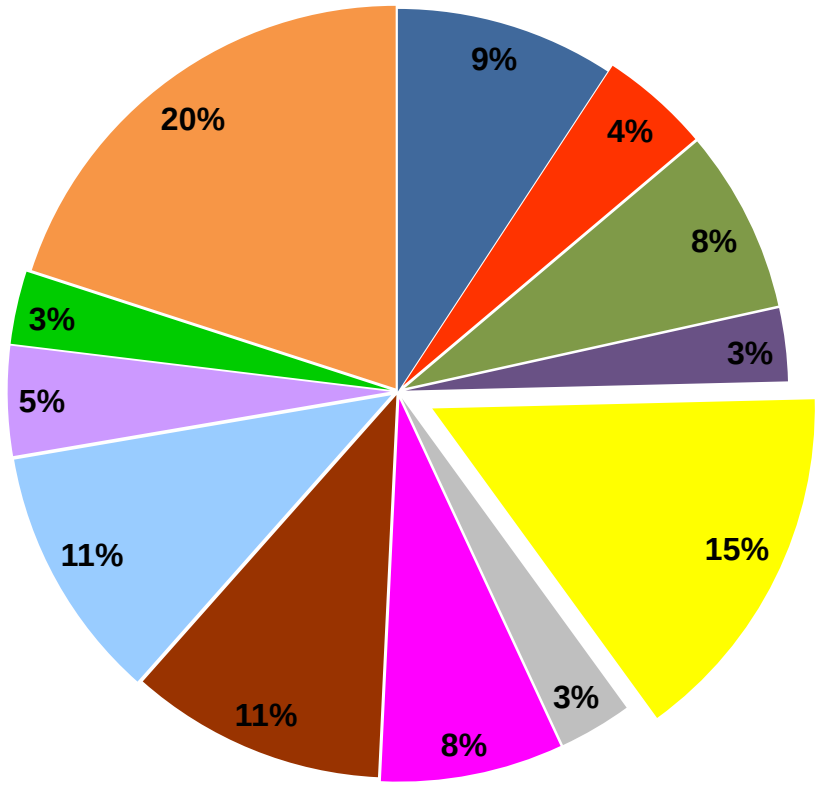


Ward Admitted to (n=26)

Ward	No.	%
Acute Med	14	54%
General Med	7	27%
Surgical	1	4%
Childrens	3	12%
Blank/Not Known	1	4%

32% (n=12) of patients were discharged straight from the emergency department

Co-morbidities (n=30)



Type of diabetes (n=38)

	N=38	%	N=203	%
Type 1	15	39%	99	49%
Type 2	11	29%	53	26%
Unconfirmed	2	6%	44	22%
Non Diabetes	10	26%	3	1%
Secondary			4	2%

	N=38	%	N=203	%
Conscious	23	61%	138	68%
Unconscious	7	18%	65	32%
Blank/Not known	8	21%	-	-

Non Diabetic patients (n=10)

- Ketotic hypoglycaemia *(3yr Old)*
- Dementia, decreased oral intake
- GORD, poor feeding *(2yr Old)*
- Tumour induced hypoglycaemia
- Unknown ref'd to GOSH for metabolic investigations *(8yr old)*
- Unknown *(15yr old)*
- ? ETOH induced
- Fanconi syndrome, congenital hyperinsulinism and VSD *(1yr old)*
- Poor feeding *(1yr Old)*
- Diagnoses include hypoglycaemia, arrhythmia or vasovagal.

Symptom which prompted presentation (n=38)

	N=38	%
Autonomic	7	18%
Neuroglycopenic	21	55%
Not Eating/Drinking	4	11%
Hypo Unawareness	3	8%
Not Known	3	8%

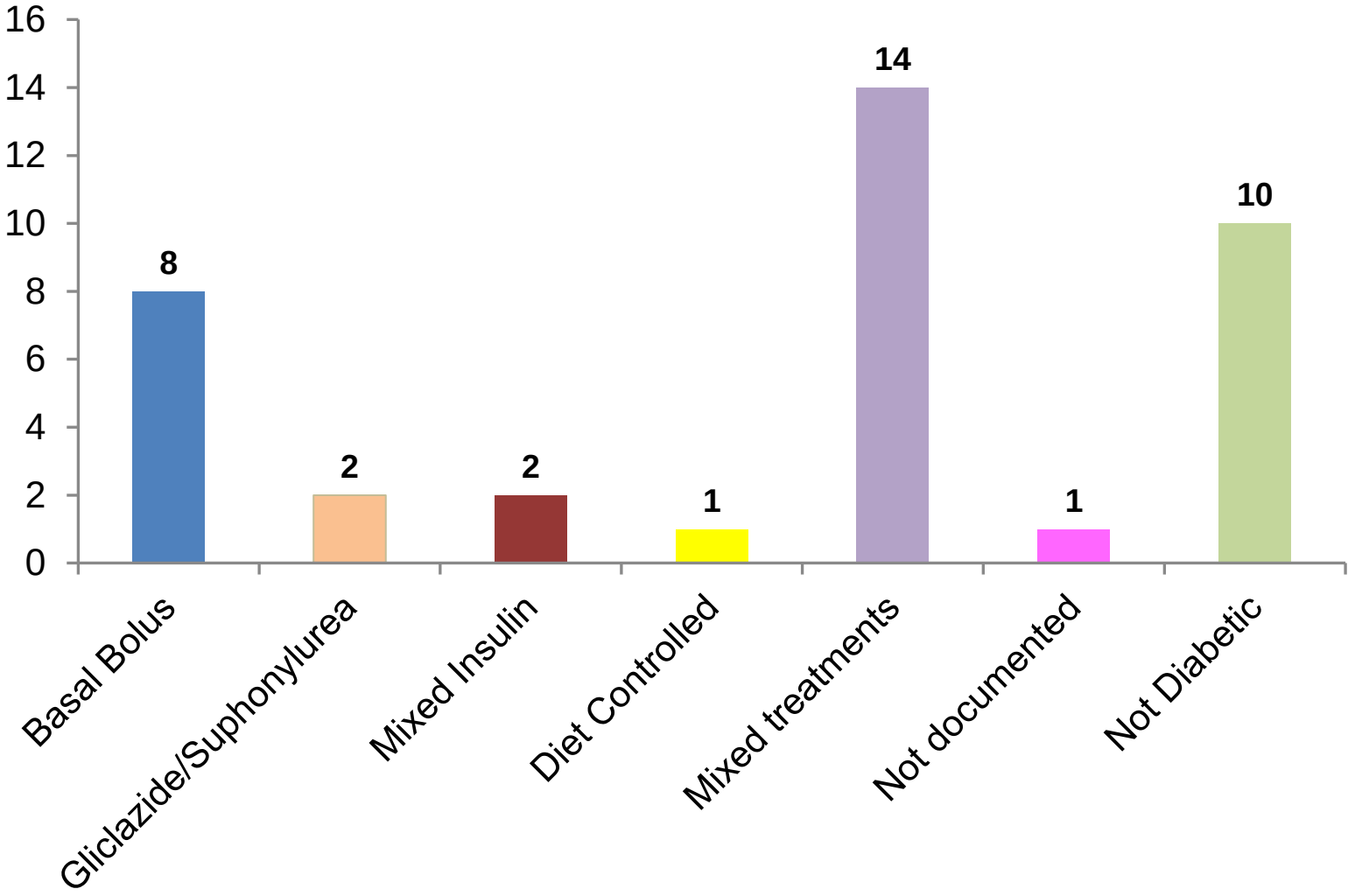
50% of patients had other complications beyond the Hypo event, e.g. fall x 7, seizure, car crash

Blood Glucose (first recorded)

	N=38	%	N=203	%
≤ 1	6	16%	5	2%
1.1 - 2	8	21%	71	35%
2.1 – 3	10	26%	71	36%
3.1 – 4	5	13%	36	18%
≥ 4.1	0	0%	16	8%
Blank/Not Known	9	24%	1	0.5%

- **13%** (n=5) of action taken was not appropriate on arrival to A & E
- Only **45%** of patients were given a long acting carbohydrate once the BM was greater than 4

Current Diabetes Medication (n=38)



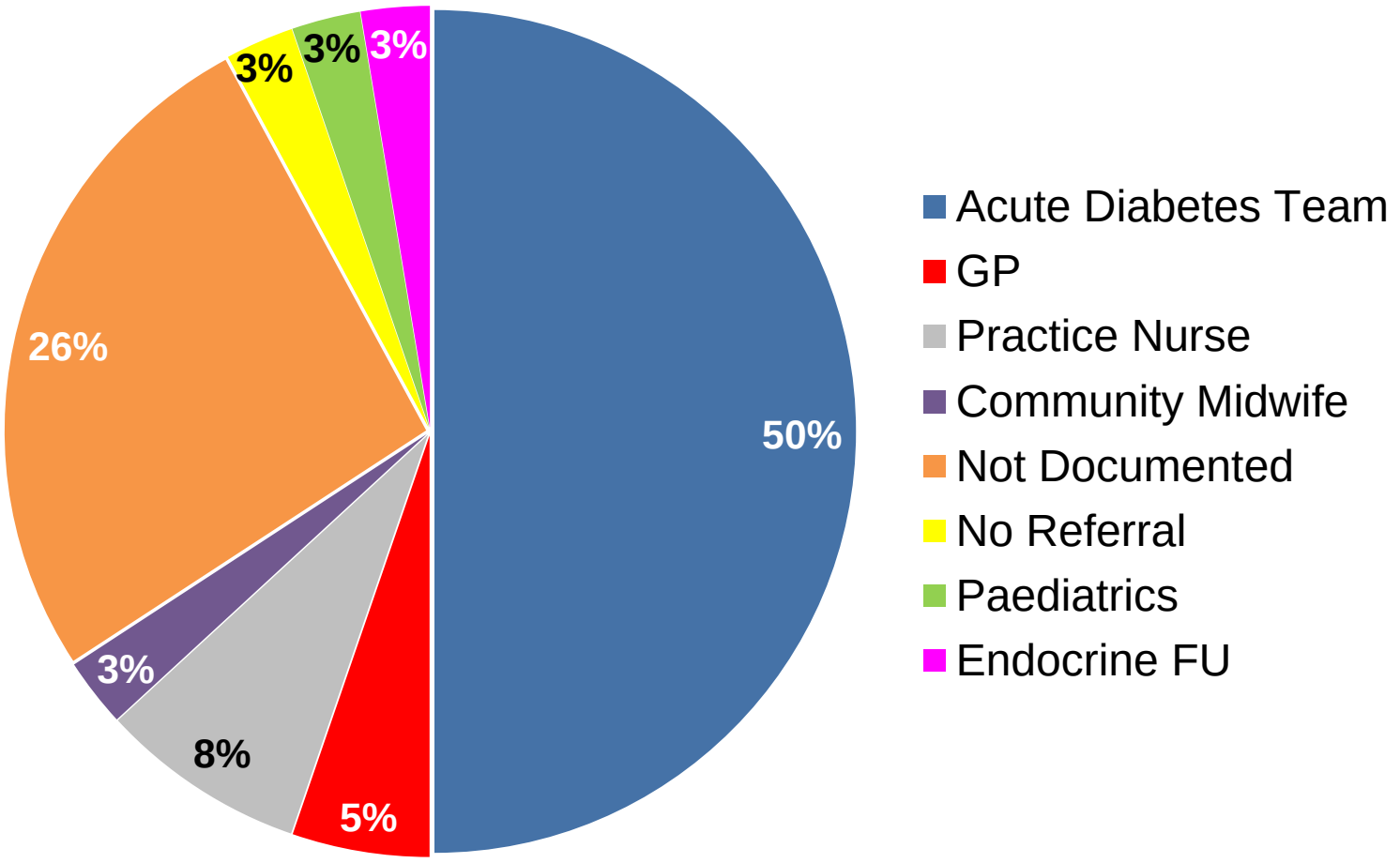
Driving and Admissions (n=38)

Only **5%** of patients had driving discussed and documented in the notes.

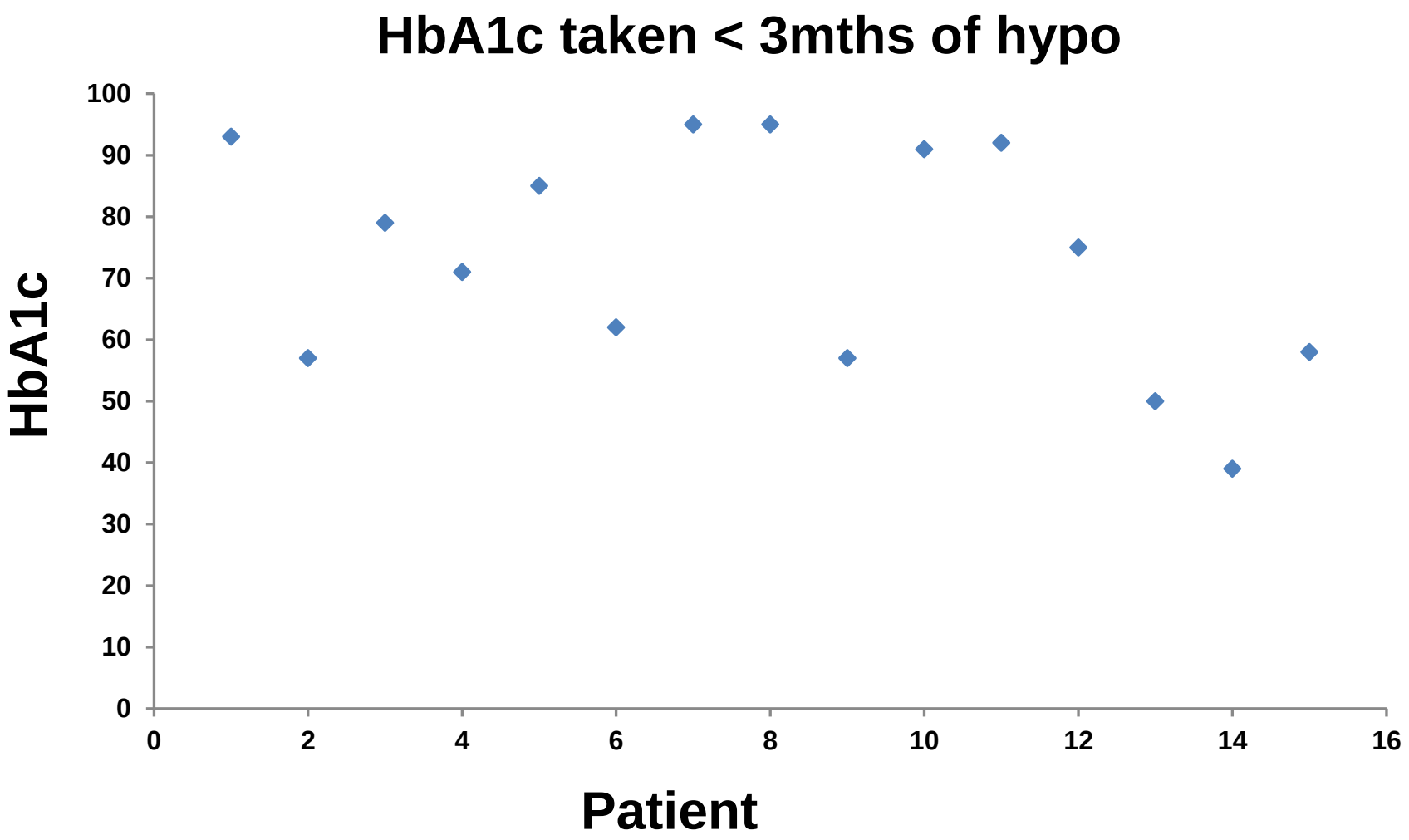
The trust hypoglycaemic pathway was followed for 61% of patients.

18% had recent hypo admissions in the last year, and 50% had other recent admissions in the last year

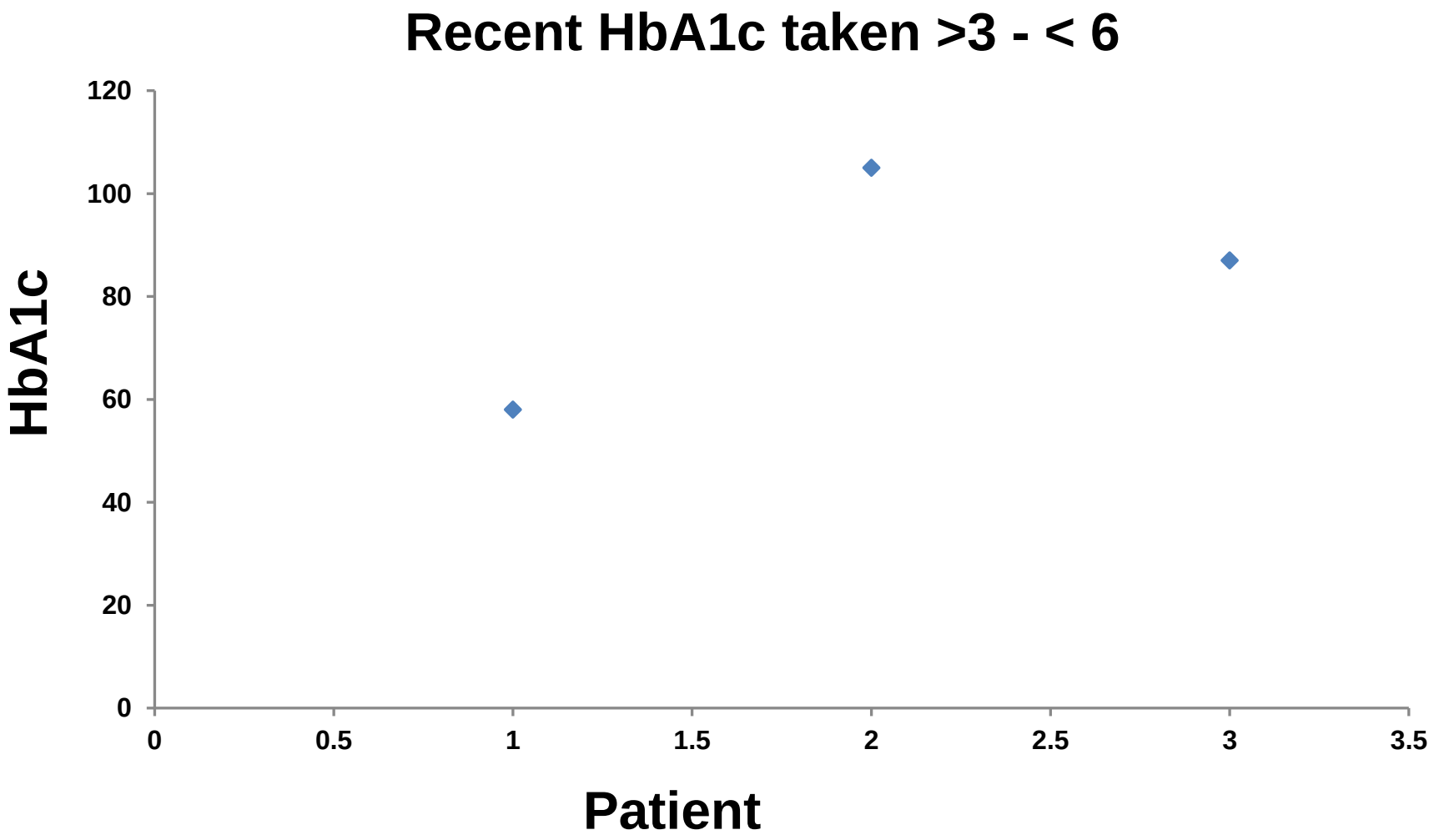
Patient Referred to (n=38)



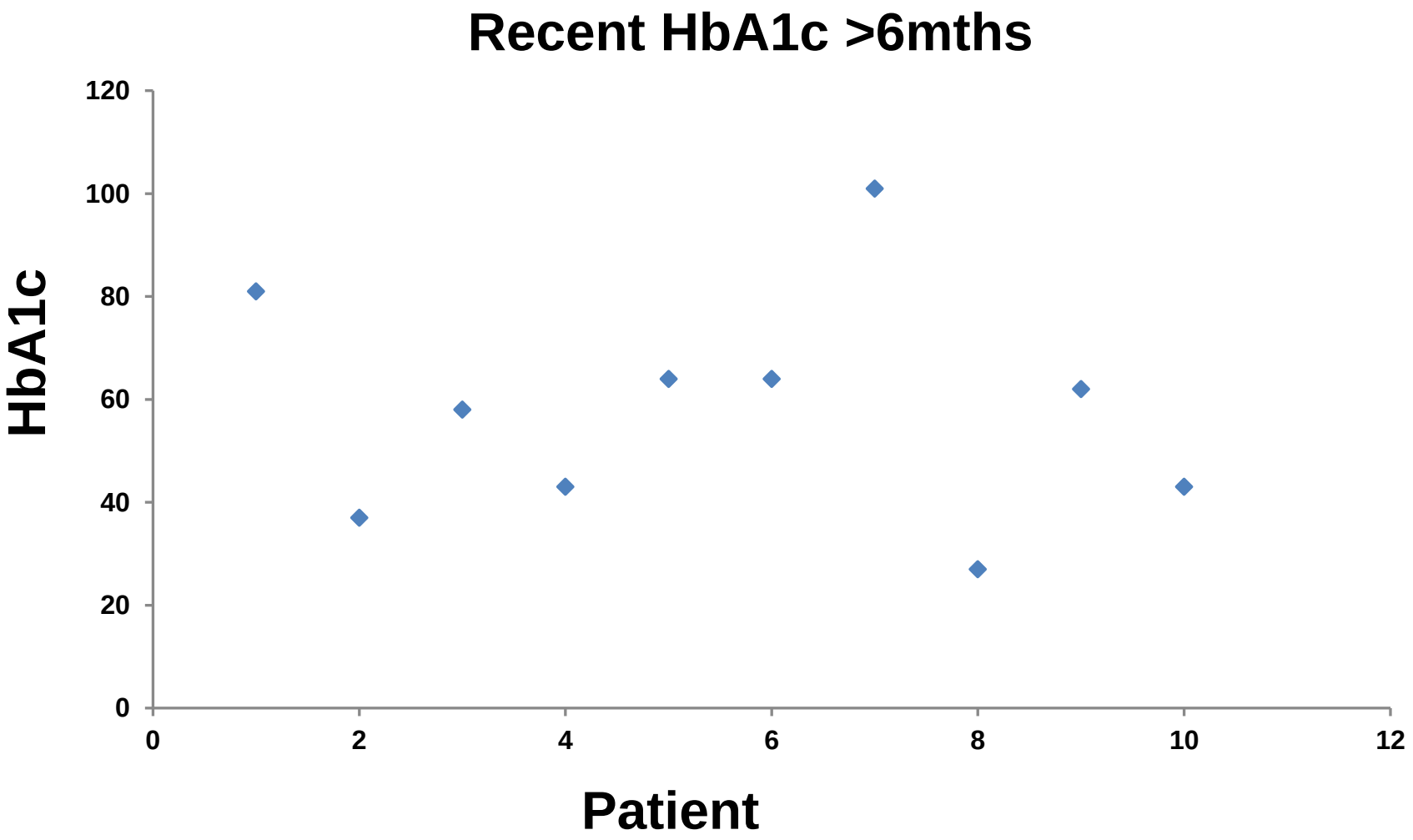
Recent HbA1c taken before Hypo event (n=28)



Recent HbA1c taken before Hypo event (n=28)



Recent HbA1c taken before Hypo event (n=28)

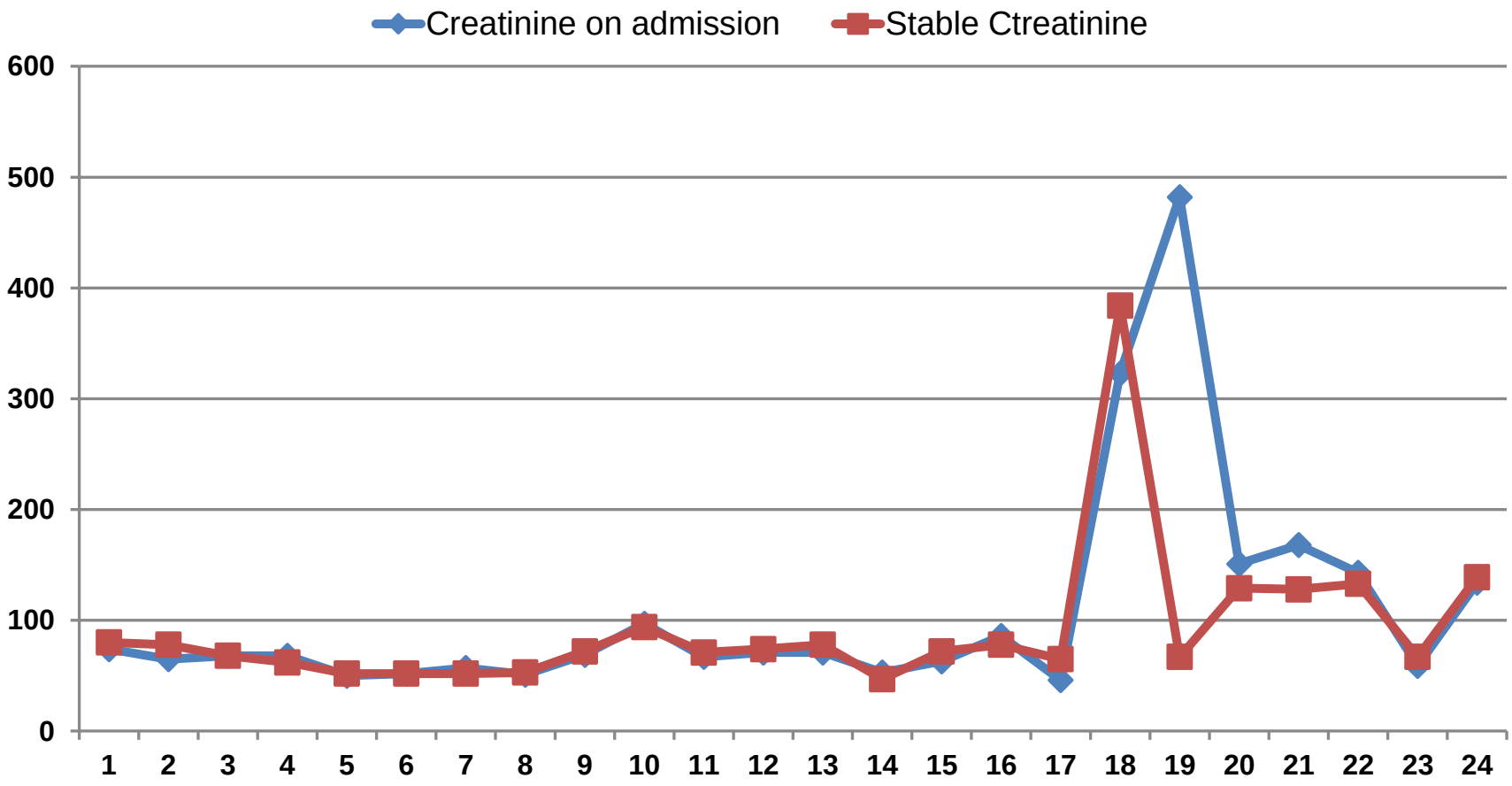


Known to hospital/community

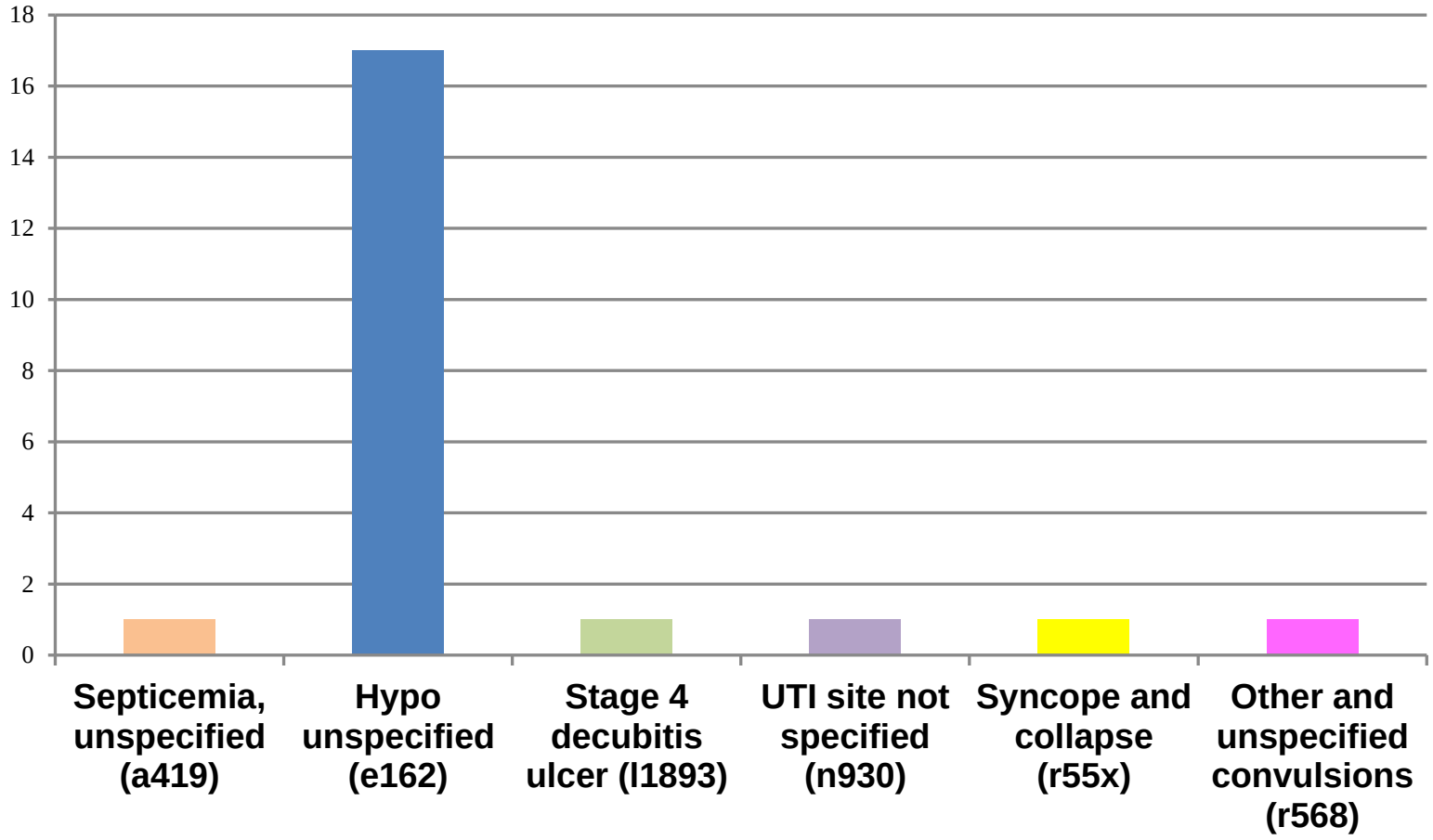
	N=38	%
Known to Hospital	16	42%
Not known to Hospital	21	55%
Blank/Not Known	1	3%

	N=21	%
Known to Community	4	19%
Not known to Community	5	24%
Blank/Not Known	12	58%

Patient's Creatinine on admission - (n = 24)



Coding (n=22)


18
16
14
12
10
8
6
4
2
0
Septicemia, unspecified (a419)
Hypo unspecified (e162)
Stage 4 decubitis ulcer (l1893)
UTI site not specified (n930)
Syncope and collapse (r55x)
Other and unspecified convulsions (r568)

Patient Mortality (n=8)

21% of patients have since passed away
(Ages, 1yr, 43yrs, 52yrs, 66yrs, 79yrs, 83yrs, 87yrs and 92yrs)

2 of these patients did not have a diagnosis of diabetes (1yr old and 79yr old)

Patient Mortality (n=8)

DOB	Date of Hypo	Date of Death	Contributing Factors?	Seen by DOT at time of Hypo
07/01/1973	04/03/2015	28/10/2015		Y
17/06/1924	03/06/2015	21/11/2015	AKI, CR 845	N
09/10/1933	14/09/2015	20/09/2015	aspiration pneumonia	N
30/11/1964	17/08/2015	27/08/2015	Out of hospital cardiac arrest, asystole	Y
27/07/1929	11/08/2015	11/08/2015	hypoglycaemia, AKI, metabolic acidosis, raised ketones, high anion gap	Y
29/04/2015	24/07/2015	04/11/2015	Cardiac arrest	N
29/11/1937	25/07/2015	14/08/2015	Sepsis, Dementia	N
20/04/1950	18/07/2015	21/10/2015	cardiac arrest, lactate 9.5, VBG ph 6.8	Y

Conclusions

- **~50%** are over 60yrs of age
- **63%** are Male from EAHSN project but 61% are Female from the re-audit
- Majority of patients have a short stay (0-1 days)
- Over **50%** are admitted to Acute Med ward
- Main Co-morbidities are IHD, Dementia and Hypothyroidism/Hypertyroidism
- Majority of patients are Type 1,

EAHSN - **49%** compared to **26%** Type 2. Re-audit - **39%** compared to **29%** Type 2

Conclusions

- Most common symptom which prompted presentation was ‘Neuroglycopenic’
- A high proportion on patients coming through A & E with a hypo event do not have diabetes (**26%**)
- The trust hypoglycaemic pathway was followed for **61%** of patients.
- Only **45%** of patients were given a long acting carbohydrate once the BM was greater than 4
- **18%** had hypo re-admissions in the last year
- **61%** are either known to the Hospital or Community
- It appears that creatinine remains unchanged on admission and therfore may not be a large contributing factor to hypo’s

Acknowledgements

- **Ed Hoy**
- **Alina Barcan**
- **Carol Knowles**
- **Dr A Solomon**

Finally …

- new friends …new technologies……and

dexcom | G5™ mobile

- new ways of using best friends…

Any Questions?