Insulin in DM2 Paul Dromgoole Mediconf April 2012-04-28
Dermis is 2.5mm thick a 4-6mm needle is adequate unless patient has a tremor when may need 8mm
The post prandial rise in Glucose causes the HBA1C to rise. The 2h post meal sugars are the worst of the 24 hours
People on tight control [Basal + 4 shots] won't be able to skip breakfast without going into a hypo
50% of endogenous Insulin is the continuous background and 50% the post prandial increases
Injecting Basal Insulin only is not good enough unless some endogenous Insulin still present. The increasing B cell failure means there is no extra Insulin to cover meals so Glucose and HBA1C rises. Just increasing Basal Insulin results in overeating due to increased hunger and increased risk of nocturnal hypos
There is an article: IDF Post Meal Glucose Does It Matter? Associated with increased CVD and Retinopathy

Rapid Acting Insulins Novorapid Humalog Apidra all analog fewer hypos
Soluble Insulins Actrapid Humulin S
Mixes Humalog Mix 25 and Humalog Mix 50 Novomix 30 all analog fewer nocturnal hypos
Humulin M3 Insuman Com 25

All use Isophane Insulins [Insulatard or Humulin I] as the long acting component
It is essential to mix the Insulin before injecting or it will act like a rapid acting Insulin and cause a hypo 10-20 x rolled to mix
Long Acting Glargine Levemir analog
Insulatard Humulin I

By the time HBA1C is 10-11 it is time for Insulin but injectable GLP1s may get results with drop in HBA1C and/or weight but results not guaranteed. Work in 80% Pioglitazone also works by lowering Insulin resistance but main problem is fluid retention which is worsened by combination with Insulin. If giving both Insulin and PGZ wise to do an ECHO in case HF is unmasked by using it. If there is retinopathy or nephropathy start Insulin. Reduce HBA1C slowly as rapid reduction worsens retinopathy and neuropathy too [can become very painful as cells resent the withdrawal of the sugar]. Starting GLP1 many now start at BMI 30 rather than 35 especially if South Asian or Afro Caribbean. Now Bydureon 2mg weekly Exenatide is available.

REGIMES

Basal only Glargine or Levemir analog
Insulatard or Humulin I

Don't go too high or wt gain and BP rises. Max 50u. Plus MF 1G bd [not 850x3] MF also reduces cancer risk by 50%. May continue Gliclazide as it helps the mealtime Glucose. Also may keep Pioglitazone but increased fluid retention means an ECHO should be done first.

BD Mixes Novomix 30 Humalog Mix 25 Humalog Mix 50 analog

Humulin M3 Insuman Com 25 problem more nocturnal hypos

Some people who are very overweight and thus Insulin resistant can have tid mix with Humalog 50 which is better than Basal+ several shots of rapid acting Insulin. Do not use Gliclazide with the mixes better to go to Humalog 50.

There are a few patients still on Porcine or Bovine Insulins [short acting for Type 1 DMs]. Don't try to change them. They are synthetic no longer extracted from the animals

In CKD4 the kidney excretion of Insulin is reduced. So there are more nocturnal hypos on Glargine or Levemir. Give Insulatard or Humulin I in the am or a once daily mix in the am

Targets Age 70 HBA1C 7
Age 80 HBA1C 8
Age 90 HBA1C 9

Exception Code "Max Tolerated Treatment" XAJ5j Also use if patient refuses more treatment

SUMMARY OF REGIMES

Soluble Mix Humulin M3 Insuman Com 25 20-30 mins before food
Analog Mix Humalog Mix 25 [or 50] Novomix 30 At time of eating
Once Daily Glargine Levemir analog or Humilain I Insulatard Isophane
Not Favoured Basal + Rapid 3-4 shots

Self adjusting of Insulin dose "5-9 Most of the Time"
Start a Basal at Wt / 4 or Wt/5 units/24h
Start a Mix at Wt/3 then split with more in am e.g. 18/12 not 15/15

Sugars reflect previous Insulin injection e.g. high in am from high in pm..not enough pm Insulin Test at different times on different days sometimes before breakfast sometimes 2h before a meal sometimes late at night. Testing pre food is as good as testing 2h after

When increasing Increase by 10% [min 2 units] when decreasing to avoid a hypo decrease by 20%

Avoiding hypos

Be aware of what hypo symptoms are
Anticipate exercise or activity and reduce am dose reduce by 20% or even 30% if strenuous exercise anticipated
Hypos during sleep
A low pm sugar may rise in am due either to over eating following waking with a hypo or from rebound following a hypo that is slept through
May need to change to an analog mix and lower the pm dose by 20%
Test before bed and take a snack
Analog doses = Isophane doses by the way
HBA1C will fall even though dose lowered as won't be over eating following a hypo
Use same drug firm when changing so that same pens can be used

GLUCAGON

Supply to severe cases [paramedics called]
Pregnancy as they are run very tight

Frequent severe hypos deplete the liver of Glycogen so sometimes the Glucagon does not work so always call the Paramedics. Also after fill up on carbohydrate
Hypo unawareness this means a secondary care referral they will look for rare things like Addison's disease [low cortisol so Insulin unopposed]
Few die in the night from a hypo unless really severe coronary disease
Patients either wake up or sleep through and wake with a headache and a high Glucose. These people show good pre breakfast readings with occasional highs from the hypo
People on Basal only should test x1 a day sometimes before breakfast sometimes 2h after the main meal
If sugars high go to a bd mix or a once a day am mix if CKD4 [to avoid nocturnal hypo]
Basal only only controls fasting blood Glucose and won't work as B cells fail resulting in high post prandial sugars. Also the Gliclazide won't last for very long as it needs functioning B cells to work

Other pictures: Sugars all over the place. We need some history here
Activity?
Alcohol? Blocks Glucose release from liver Glycogen as liver is busy detoxing alcohol
Food?
Injection sites Hypo occurs if patient moves from a thickened lipohypertrophic site to a new one. Patents should not inject constantly in same place as the fat layer thickens [skin bulges] and absorption is reduced. When moving off such a site reduce dose by 30%! The injections should move around the whole area of either the abdomen or outsides of thighs. Also when switching from abdo to thigh or back check sugars as there will be a slight difference in absorption

Another picture: on steroids e.g. Poly Myalgia Rheumatica
Am sugar ok all the others raised
If on Mix may inc the am dose
If on Basal may add a fast acting shot at lunch

Illness/infection/feeling unwell
For 5 days increase testing and add comments about diet etc for the Health Professional. Pre meal testing will do. Glucose of 6-12 is good enough during illness including long steroid course

Another picture: Huge doses of Insulin and sugars always up
Liraglutide can be given with Levemir and Exenatide with any Basal Insulin. Must be started in secondary care. Dose of Insulin is halved
Pioglitazone can be added in Primary Care but do ECHO
Also go to Humalog Mix 50 to increase short acting Insulin. [The long acting Insulin drives hunger don't increase it]. Then try reducing the mix by 20% as may eat less as well. Be ready with treatment for hypos. Stop Gliclazide. Increase MF if tolerated [may try slow release].