

Mangement of feline diabetes: how to maximise quality of life for pet, owner and vet

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MRCVS

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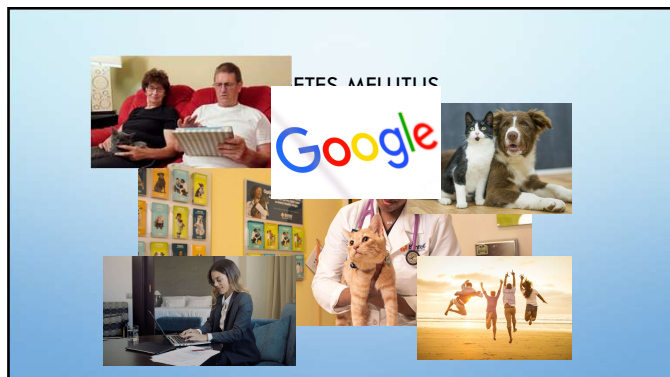
FELINE DIABETES

ESTABLISHED KNOWLEDGE ON PATHOPHYSIOLOGY AND MANAGEMENT

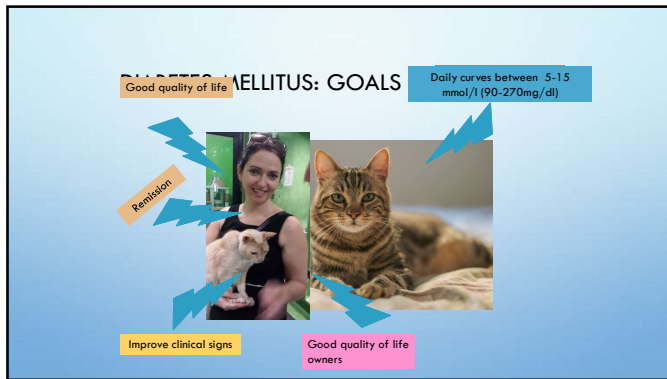
Cats: "type 2"

- Metabolic disease (not immune-mediated destruction)
 - Genes
 - Insulin resistance (genetic and environmental)
- Remission is possible (15-35% patients)
- Treatment: insulin + diet

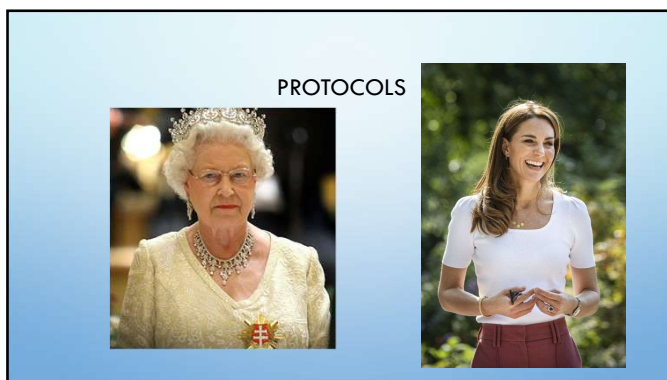
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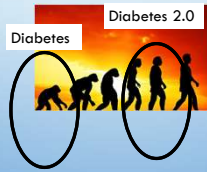
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HOW CAN WE OBTAIN THOSE GOALS?

- **Insulin**
- **Diet**
 - **CATS:** low in carbohydrates (wet better than dry)
- **Monitoring**
 - CLINICAL signs
 - Glycemic parameters
 - At home/in the clinic

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NEW ERA OF DIABETES MANAGEMENT

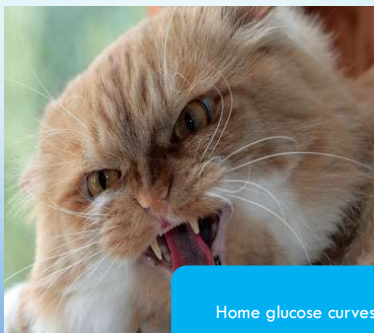


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RELATIONSHIP WITH THE OWNERS

- EACH OWNER OR CAT-OWNER COMBINATION HAS UNIQUE CIRCUMSTANCES
- THOSE CIRCUMSTANCES NEED TO BE IDENTIFIED AND THE TREATMENT NEEDS TO BEAR THOSE IN MIND TO AVOID LOSING TOUCH WITH THE OWNER
- EACH COMBINATION WILL HAVE ADVANTAGES AND DISADVANTAGES AND THESE NEED TO BE EXPLAINED TO THE OWNERS.

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Home glucose curves?

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INDIVIDUALISED CARE



Injection am & pm

~~Management obesity~~



Injection am & pm

Management obesity

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At home am & pm

Cost is a problem



Home am & pm

~~Cost is a problem~~

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AT THE TIME OF DIAGNOSIS

- DAILY INJECTIONS
- DIET CHANGE
- NO TREATS/SNACKS
- 2 WEEKLY GLUCOSE CURVES UNTIL WE GET GOOD CONTROL OF THE DISEASE



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QUALITY OF LIFE OF THE PATIENT

- CURRENTLY ALL PROTOCOLS FOCUSED ON GLYCEMIC PARAMETERS
- ARE THEY REALLY THAT IMPORTANT?

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QUALITY OF LIFE OF THE VET



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ADAPTACIÓN!

- **ALOMEJOR DAR PREMIOS NO ES TAN MALO**
 - VERDURAS
 - PREMIOS DIETÉTICOS
 - OTROS: NUESTRAS CURVAS NO SERÁN TAN BONITAS, PERO.....
- **CAMBIO DE DIETA**
 - PERROS: W/D O SIMILAR
 - GATOS: PURINA DM, HILL'S M/D
- **ALOMEJOR PODEMOS REDUCIR FRECUENCIA CURVAS DE GLUCOSA**
 - FRUCTOSAMINA
 - CURVAS EN CASA VS EN LA CLÍNICA
 - MONITORES CONTINUOS DE GLUCOSA

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HOW TO SUCCEED IN THE MANAGEMENT OF DIABETES 2.0



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DIET:



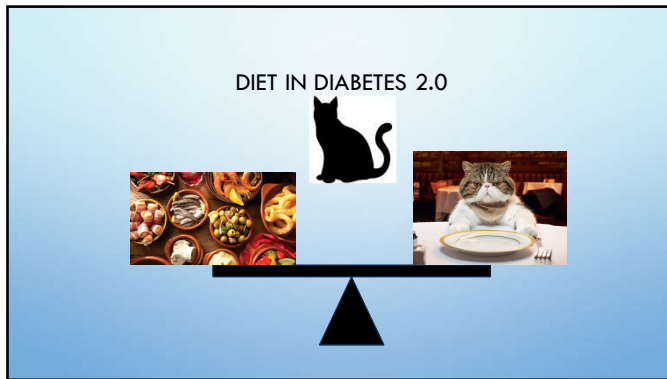
- Important reduction in CH content (<7% metabolizable energy)
 - Wet better than dry (less caloric density)
- Options:
 - Kitten diet (high protein, high fat, less ch)
 - Other diets (not ideal, but can achieve good control)
 - CKD
 - IBD
 - Skin problems, etc.

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DIET

- Meals vs grazing
 - Set meals are important in dogs as post-prandial hyperglycemia can affect regulation
 - Post-prandial hyperglycemia is less prominent in cats
 - Both options are therefore acceptable and can be left to the cat/owners preference
 - Avoid ad-lib in obese cats to limit caloric intake

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INSULIN: DOSE DEPENDING ON PRE-INSULIN GLUCOSE

- CATS ABOUT TO ENTER REMISSION
- CATS WITH VARIABLE APETITE
- CAREFUL! CAN AFFECT QUALITY OF LIFE

Table 2: example of the insulin dosing guidelines provided to the owner of a diabetic cat on the basis of pre-injection spot home blood glucose testing in anorectic cats or those about to enter diabetic remission

Blood glucose concentration (before food and insulin)	Recommended insulin dose
>15 mmol/L (270 mg/dl)	Full dose of insulin (minimum of 1 IU)
10-15 mmol/L (180-270 mg/dl)	½ dose of insulin (minimum of 0.5 IU)
8-10 mmol/L (144-180 mg/dl)	¼ dose of insulin (minimum of 0.5 IU)
<8 mmol/L (144 mg/dl)	No insulin

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AVAILABLE INSULIN TYPES

- PROZINC
- GLARGINE
- DETEMIR
- LISPRO

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MANAGEMENT DIABETES 2.0



- ADAPT INSULIN AND FEEDING TO EACH OWNER-CAT COMBINATION
- PROTOCOLS ALSO AFFECT OWNER'S QUALITY OF LIFE
- OWNER'S QUALITY OF LIFE CAN PUSH TOWARDS A DECISION FOR EUTANASIA

NESSEN ET AL. J VET INTERN MED. 2012 JUL-AUG;26(4):933-61

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MONITORING IN DIABETES 2.0:

Always use clinical picture

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Factor	Score
Unintended Weight Loss 0 = None, or gained since last examined 1 = Mild (<5% loss) 2 = Moderate (5-10% loss) 3 = Severe (>10% loss)	
Polyuria and Polydipsia 0 = Normal 1 = Mild (Some increase noted by owner) 2 = Moderate (Increased filling of water bowl) 3 = Severe (constantly at bowl)	
Appetite 0 = Normal or decreased appetite 1 = Mild polyphagia (finishes eagerly) 2 = Moderate polyphagia (finished eagerly and begs for more) 3 = Severe polyphagia (obsessed with food)	
Attitude/activity 0 = Normal 1 = Mild decrease (a bit less running and jumping) 2 = Moderate decrease (a lot less running and jumping) 3 = Severe decrease (lying about all the time)	
Total Score =	

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METHODS TO SUPPORT MONITORING

- SPOT BG



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FRUCTOSAMINE

- ATTRACTIVE IN PRINCIPLE

But be careful!



Patient factors
Glycemic factors
Laboratory factors

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Veterinary Clinical Pathology 69(9):627-632

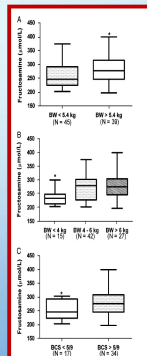
ORIGINAL RESEARCH

The effects of body weight, body condition score, sex, and age on serum fructosamine concentrations in clinically healthy cats

Chen Glor¹, Thomas K. Graves¹, B. Duncan X. Lascelles², Andrea E. Thomson¹, Wendy Simpson³, David S. Hapern⁴

¹Department of Veterinary Clinical Medicine, College of Veterinary Medicine, University of Illinois-Champaign, Urbana, IL, USA; ²Department of Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC, USA; ³Norman Cat Hospital, Normandy, NC, USA; and ⁴Tulane Animal Hospital, Richmond, VA, USA

- FRUCTOSAMINE IS HIGHER IN PATIENTS WITH HIGHER WEIGHT
- LEAN CATS HAVE LOWER FRUCTOSAMINE
- MALES HAVE A HIGHER FRUCTOSAMINE



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FRUCTOSAMINE: LIMITATIONS

- EXPERIMENTALLY INDUCED HYPERGLYCEMIA IN CATS:
 - FRUCTOSAMINE ↑ IN 3 DAYS WHEN BG 300-600 MG/DL (15-30MMOL/L)
 - FRUCTOSAMINE DOESN'T ↑ WHEN BG <300 MG/DL (15 MMOL/L) DURING 6 WEEKS

Journal of Feline Medicine and Surgery (2005) 19, 583-592
doi:10.1016/j.jfms.2005.08.005

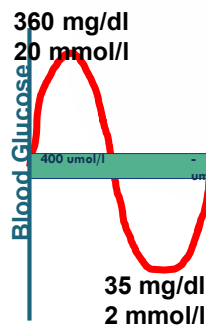


jfms

Changes in blood glucose concentration are associated with relatively rapid changes in circulating fructosamine concentrations in cats[☆]

Karl R Link BS, DVM, PhD¹, Jacqui S Rand DVM, DABVP, DiplomACVIM

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FRUCTOSAMINE: LIMITATIONS

- LIYEMIA, AZOTEMIA, HYPOPROTEINEMIA, TRANSIT TIME ↓
- HYPOGLYCEMIA-INDUCED OR HYPERGLYCEMIA (SOMOGYI): FRUCTOSAMINE ↑
- HYPERTHYROIDISM: PROTEIN CATABOLISM IS INCREASED, FRUCTOSAMINE IS LOWER



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FRUCTOSAMINE

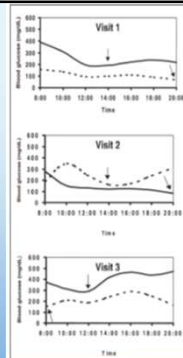
Helps in difficult cases
Do not trust if the clinical signs do not match
Supplement with a BG curve if more detail is needed

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GLUCOSE CURVES

- EVALUATION OF DAY-TO-DAY VARIABILITY OF SERIAL BLOOD GLUCOSE CONCENTRATION CURVES IN DIABETIC DOGS

• FLEEMAN ET AL. JAVMA 2003; 222:317-321



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Day-to-day variability of blood glucose concentration curves generated at home in cats with diabetes mellitus

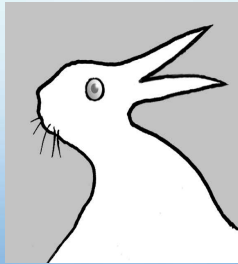
Nima Ali, DVM, Saskia Kley, DVM, Michael Haessig, DVM, PhD, Claudia E. Rensch, DVM, PhD

- Same with BG curves
- Home paired curves: same insulin adjustment **6/14**
- Home and hospital-paired curves: same insulin adjustment **14/28**

curves generated during blood collection at home than cats with poorer control. J Am Vet Med Assoc 2007;200:1011-1017

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INTERPRETATION CURVE




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INTERPRETATION CURVE

- Avoid over-interpreting
- Distrust if curve does not match clinical signs
- Spot blood glucose
 - Too much variability
 - Only useful if hypoglycemia is detected



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CATS

Dosing protocol for cats on glargine or detemir using daily home monitoring of blood glucose concentrations to adjust insulin dose

Rosamp K, RAND JS Evaluation of intensive blood glucose control using glargine in diabetic cats. Vet Intern Med 2008; 22 (3):770. Rosamp K, RAND JS Factors predictive of non-insulin dependence in diabetic cats initially treated with insulin. Vet Intern Med 2008; 22 (3):791; and Rosamp and Rand, unpublished data

Table 3A. Parameters for changing insulin dosage when using insulin glargine (Lantus) or detemir (Levemir) together with home monitoring of blood glucose concentrations in a mixed breed or domestic shorthair blood glucose control. Blood glucose should be measured at least 3 times daily with a glucometer. This protocol was tested in 55 diabetic cats for glargine and 19 diabetic cats for detemir. Owners measured blood glucose an average of 5 times daily and adjusted insulin dose based on the protocol. This has not been tested with veterinarian-measured blood glucose curves once every week or two weeks, and Table 2 is recommended if intensive home monitoring is not being performed.

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Phase 3: Holding the dose. Aim to keep blood glucose concentration within 50-200 mg/dL (2.8–11 mmol/L) throughout the day. If blood glucose is < 50 mg/dL (< 2.8 mmol/L) If nadir or peak blood glucose concentration > 200mg/dL (11 mmol/L)	Reduce dose by 0.25-0.5 IU depending on if cat on low or high dose of insulin Increase dose by 0.25-0.5 IU depending on if cat on low or high dose of insulin and the degree of hyperglycaemia
Phase 4: Reducing the dose. Phase out insulin slowly by 0.25-0.5 IU depending on dose. When the cat regularly (every day for at least one week), has its lowest blood glucose concentration in the normal range of a healthy cat, and stays under 100 mg/dL overall If the nadir glucose concentration is 40–<50 mg/dL (2.2–<2.8 mmol/L) at least three times on separate days If the cat drops below 40 mg/dL once (2.2 mmol/L) If peak blood glucose concentration > 200mg/dL (11 mmol/L)	Reduce dose by 0.25-0.5 IU depending on if cat on low or high dose of insulin Reduce dose by 0.25-0.5 IU depending on if cat on low or high dose of insulin Reduce dose immediately by 0.25-0.5 IU depending on if cat on low or high dose of insulin Immediately increase insulin dose to last effective dose
Phase 5: Reinitiation. Hypoglycaemia for a minimum of 14 days without insulin.	

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GLUCOSE CURVES?

- Is it worth doing them?
 - Yes, in complicated patients
 - Can help detect hypoglycaemia
- Caution with interpreting
 - Do not over-interpret
 - Always together with the clinical signs

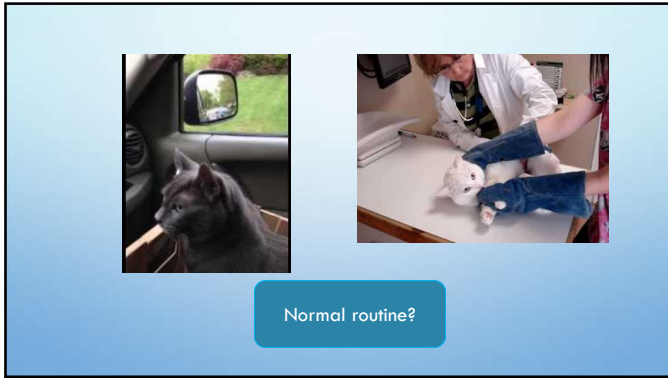
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MONITORING IN THE CLINIC:

- Animal comes to the practice
- Vet sees the case
- Physical exam
- Glucose curves
- Decisions about dose, type of insulin, etc.



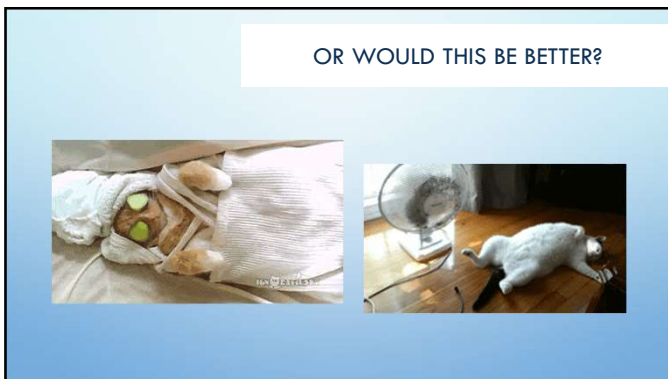
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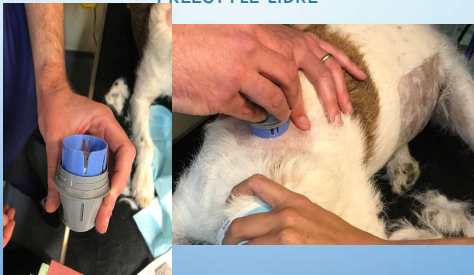
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GLUCOSE CURVES

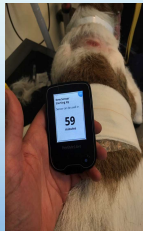


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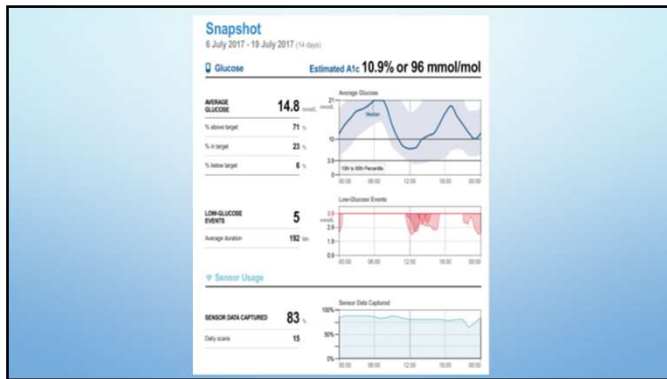
FREESTYLE LIBRE



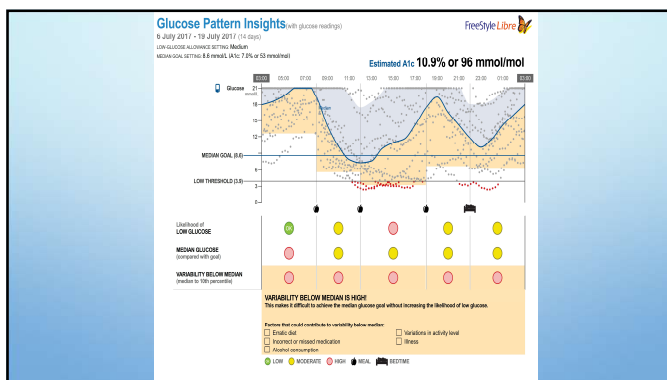
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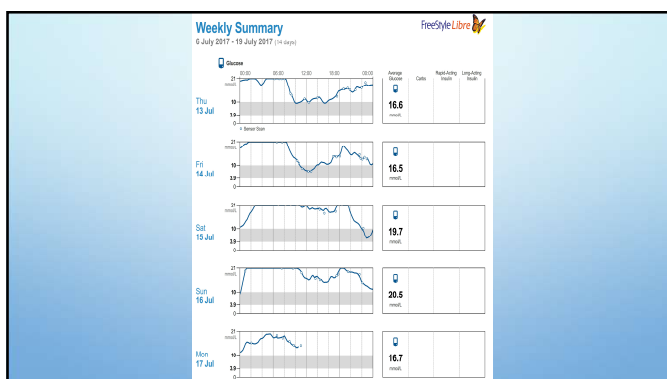
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IDENTIFIES TRENDS

How to use the FreeStyle Libre System

Information from several days

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SUMMARY

- IMPORTANT TO BEAR IN MIND THE SITUATION OF EACH PATIENT AND THEIR OWNERS
- WE SHOULD BE ADAPTING OUR PROTOCOLS TO EACH CAT-OWNER PROTOCOL
- OWNER AND PATIENT'S QUALITY OF LIFE ARE MORE IMPORTANT TAN OBTAINING GOOD CURVES

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Good quality of life

REMISSION

Improve clinical signs

DIABETES MELLITUS: GOALS

Daily curves between 5-15 mmol/l (90-270mg/dl)

Good quality of life owners

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