

Diabetes Expert Witness on: Diabetic Hypoglycemia in Nursing Homes

Nursing home patients with diabetes treated with insulin and certain oral diabetes medications (i.e. sulfonylureas and glitinides) are at increased risk for diabetic hypoglycemia. As can be seen in the case report below, this can be fatal. A medical expert witness with training in diabetes and endocrine disorders can help counsel review comorbidities, care provided, and determine if the treatment at the nursing home was below the standard of care.

Case Report:

Mary was a 60 year old female with a complicated past medical history including poorly controlled insulin-requiring diabetes, diabetic complications of the retina, kidneys, and peripheral nerves, severe depression, obesity, hypertension, peripheral vascular disease, and osteoarthritis. She was prescribed two types of insulin for diabetes control, and multiple oral medications for her other illnesses. Mary was admitted to a nursing and rehabilitation facility for intense physical, occupational, and speech therapy, psychiatric care, and psychotherapy.

Mary's diabetes was treated with a combination of Lantus insulin (a long-acting insulin) 20 units every morning, and NovoLog insulin (a short-acting insulin) before each meal and before bed. The following is a chart of Mary's blood sugars on this insulin regimen in the nursing facility:

Table 1.

<i>Time (hrs):</i>	<i>730</i>	<i>1130</i>	<i>1600</i>	<i>2100</i>
4/24/2012	76	137	186	195
4/25/2012	99	115	244	235
4/26/2012	69	202	171	113
4/27/2012	87	123	111	347
4/28/2012	38/41/56/103	246	83	108
4/29/2012	111		54	219
4/30/2102	127	125	118	200
5/01/2012	139	186	145	147
5/02/2012	132	180	108	144
5/03/2012	213	158	219	202
5/04/2012	218	132		

On several occasions during this admission Mary experienced moderate to severe low blood sugar (i.e. hypoglycemia, blood sugar less than 70 mg/dL). Mary's hypoglycemia occurred without any typical symptoms of hypoglycemia, a clinical scenario referred to as hypoglycemia without awareness. She experienced a dangerously low blood sugar of 34 mg/dL at 0730 hrs on 4/28/2012.

On 5/3/2012 Mary was noted to have a markedly elevated potassium level and worsening kidney function. At 2230 hrs on 5/3/2012 Mary was administered 10 units of intravenous regular insulin with one ampule of intravenous 50% dextrose (D₅₀), a usual treatment for dangerously elevated potassium.

On 5/4/2012 at 0815 hrs Mary was difficult to arouse. When awake, she was alert but oriented to her name only. Mary followed commands intermittently, had shallow respirations 6 per minute (normal 15-18 per minute), and she was responsive to painful stimuli. Her blood pressure at 0600 hrs was 87/51 mm Hg, lower than her prior blood pressure at the nursing facility which ranged from 104/65 to 194/91. Repeat laboratory studies demonstrated further worsening of her renal function and ongoing severe elevation in her potassium. She was given her usual dose of long-acting insulin (Lantus insulin 20 units), in addition to her usual dose of short-acting insulin (4 units of Novolog). The patient was awake but drowsy, and at 1030 hrs she became lethargic. Since Mary had previously been administered narcotics for pain, she was given a medication, naloxone, to oppose the effects of narcotics in an attempt to increase her state of arousal. Following the administration of the opiate antagonist naloxone, the patient became agitated and combative. At 1040 hrs she received an additional 10 units of intravenous regular insulin with one ampule of intravenous D₅₀ in an effort to correct her persistent, dangerous elevation in potassium. At 1130 hrs Ms. Mary remained confused and combative, and she had visual hallucinations. Her blood glucose was 132 at this time. Mary was then given the antipsychotic medication Haldol 1 mg and the antianxiety medication Ativan intravenously. She was placed on 1:1 nursing supervision at her bedside and it is stated in the record that she was continuously monitored. At 1330 hrs her respiratory rate was 11 per minute and her oxygen saturation was low at 88-89% (normal >90%). Oxygen therapy 2 liters/min was initiated via nasal cannula, and a second dose of naloxone was given. At 1530 hrs the patient was in greater distress, responded only to painful stimuli, and had a respiratory rate of 6 per minute. At this time she was transferred to a hospital emergency room.

On 5/4/2012 at the nursing facility blood pressure was not reassessed after 0600 hrs, and blood glucose was not monitored after 1130 hrs.

According to documentation from the hospital emergency room Mary arrived unconscious on the evening of 5/4/2012 with a glucose of 4 mg/dL (normal 70-110 mg/dL). She was given two ampules of intravenous D₅₀ with no improvement in her mental state. The following chart documents Mary's blood glucose levels during the first day of her admission:

Table 2.

<i>Time (hrs):</i>	1558	1600	1615	1645	1900	1915	2000	2015
Amps D ₅₀ IV		2				1		
Stat Lab Glucose ^a			157					
POC ^b Glucose ^a	4			75	55		139	
Lab Glucose ^a		5						138

^aexpressed in mg/dL ; ^bPOC is “point of care”, i.e. bedside glucose monitoring

Despite normalization of her blood glucose levels, intravenous antibiotics, intravenous fluids, intubation, anti-seizure therapy, and aggressive supportive management in the hospital ICU, Mary remained comatose and unresponsive. She died on 5/17/2012.

Mary’s family filed a lawsuit on her behalf against the nursing facility depicted above, claiming medical malpractice and deviation from the standard of medical care.

Definition and Description of Hypoglycemia:

Hypoglycemia is defined as a blood glucose less than 70 mg/dL. Under non-starvation conditions the brain utilizes glucose and no other fuels to supply energy for maintenance and sustenance of cellular activity and brain function. Since the brain absolutely needs glucose to remain functional and viable, mild hypoglycemia leads to altered brain function, while severe hypoglycemia can cause brain death. In a non-diabetic individual and most patients with diabetes, hypoglycemia is almost always associated with so-called neurogenic symptoms such as tremors, sweats, palpitations, hunger, paresthesias (“pins and needles” sensations), anxiety, and arousal. In the vast majority of people these symptoms prompt the individual to seek food and ward off any damage from hypoglycemia. If the blood glucose drops to 40-50 mg/dL the individual develops neuroglycopenic symptoms such as confusion, behavioral abnormalities, and abnormal psychomotor activity (i.e. mental and physical functions). These symptoms often interfere with the ability of the individual to adequately and rapidly respond to hypoglycemia. By the time blood glucose levels approach 20-30 mg/dL the individual experiences seizures and coma. When blood glucose levels remain below 15-20 mg/dL for some period of time, brain function ceases and crucial parts of the brain die.

In conclusion, since insulin administration can provoke severe hypoglycemia, insulin treatment can potentially cause death in a diabetic patient as a result of irreversible damage to brain tissue. In a nursing facility it is the responsibility of the entire health care team to avoid such a catastrophic outcome in patients treated with insulin.

Factors Increasing the Risk of Hypoglycemia in Inpatients:

The precise incidence of hypoglycemia in nursing homes is not well established. According to a 2013 workgroup of the American Diabetes Association and the Endocrine Society studying hypoglycemia and diabetes: “The risk factors

for inpatient hypoglycemia include older age, presence of comorbidities, diabetes, increasing number of antidiabetic agents, tight glyceemic control, septic shock, renal insufficiency, mechanical ventilation, and severity of illness.” In the case of Mary described above, worsening renal function, multiple injections of insulin within a short period of time, and worsening clinical status (i.e. altered mental status including hallucinations, low blood pressure, and severely elevated potassium level) increased her risk of hypoglycemia.

Glucose Monitoring of Patients with Diabetes During Inpatient Care:

Mary clearly had hypoglycemia without awareness, a dangerous condition that prevents the patient from sensing severely low blood glucose. A patient like Mary may not exhibit any symptoms of hypoglycemia until her blood glucose is sufficiently low enough to cause coma, seizures, brain damage, and death. Clearly a patient like Mary needs to have her blood sugars consistently and carefully monitored at all times. Accurate and timely blood glucose monitoring is especially crucial when the patient’s clinical condition is unstable, as was Mary’s on the evening of 5/3/2012 and on 5/4/2012. Within a reasonable degree of medical certainty, if Mary’s blood glucose had been regularly monitored in the nursing facility between 1130 hrs and 1530 hrs hypoglycemia would have been detected and treated well before hypoglycemia claimed her life.

Dietary Monitoring of Patients with Diabetes During Inpatient Care:

It is clear that patients at high risk for hypoglycemia need to eat three regular meals and three snacks daily (two between meals and one at bedtime). If a patient such as Mary is receiving insulin regularly, she must be fed frequently in order to avoid hypoglycemia. If she is eating very little of the food provided her, the medical staff must decrease her doses of insulin in order to prevent hypoglycemia. On 5/4/2012, the day of her life-ending hypoglycemic episode Mary was eating very little, since she was lethargic and/or combative. On 5/4/2012 despite her reduced food and drink intake Mary was administered her usual doses of insulin in addition to one dose of intravenous regular insulin given to treat her elevated potassium level.

Conclusion:

In summary, Mary suffered a severe and fatal hypoglycemic event in the nursing facility due to multiple factors. Her clinical condition had become unstable and increasingly complicated during the last two days of her admission. She had been known to have severe hypoglycemia without awareness earlier in her stay. She was eating and drinking much less. Failure to adequately monitor her vital signs, blood glucose, and diet during the final 4 hours of Mary’s nursing facility admission led to severe and fatal hypoglycemia.

This case was settled by the parties involved.

About the author;

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