Continuous Glucose Monitor (CGM) Survival and Accuracy Over 21 Consecutive Days

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Introduction

It is not uncommon for continuous glucose sensors to be worn beyond the recommended 7 days.
We sought to determine the causes of failure and assess sensor function when they were worn up to 3 weeks.

Materials and Methods

A total of 20 subjects (Table 1) wore Dexcom G4® sensors for up to 3 weeks twice (40 uses). Meter blood glucose (MBG) measurements were done at least 4x/day on Accu-Check Aviva® meters. Sensor performance was assessed by the daily median absolute relative difference(ARD). Sensor failures were defined as primary sensor failure ("???" message for more than two hours or persistent 20% difference between MBG and sensor glucose) or failure of sensor adhesive.

Table 1. Overall bio-demographic data	
Characteristics	Median (1st-3rd) except as listed
Number	20
Female, number (%)	11 (55%)
Age (y)	24 (20-31)
BMI (kg/m^2)	28.3 (23-33)
Diabetes duration (y)	12.5 (7-18)
HbA1c (%)	7.9 (7-8.4)
Total Daily Dose (U)	55 (43-67)
TDD/kg (U/kg)	0.64 (0.51-0.81)
Duration of Infusion Set Wear (days)	4 (3-5)

Please see related posters:
ATTD7-0151 Zone-MPC Performance
ATTD7-0252 Real-time detection of infusion-set failures

Results

Sensors were worn for a median (IQ range) of 14 days (11.25-19). 90% were functioning at end of week 1, 45% at end of week 2, and 20% at the end of week 3. The Median ARD for week 1 was 9.9%, for week 2 was 11.5%, and for week 3 was 13.4% (Figure 1). The most common cause for failure was sensor error (75%), with the majority of these sensor errors being due to "???" for more than 2 hours (79%). The other 21% failed for adhesives issues and 1 (4%) was pulled out by the patient.

Figure 1. In the upper part Kaplan-Meier curves for sensor failure divided for different reasons and in the lower part box plots with median, 25th, 75th centile with number of ARD values considered per day of sensor wear (outliers are not shown).
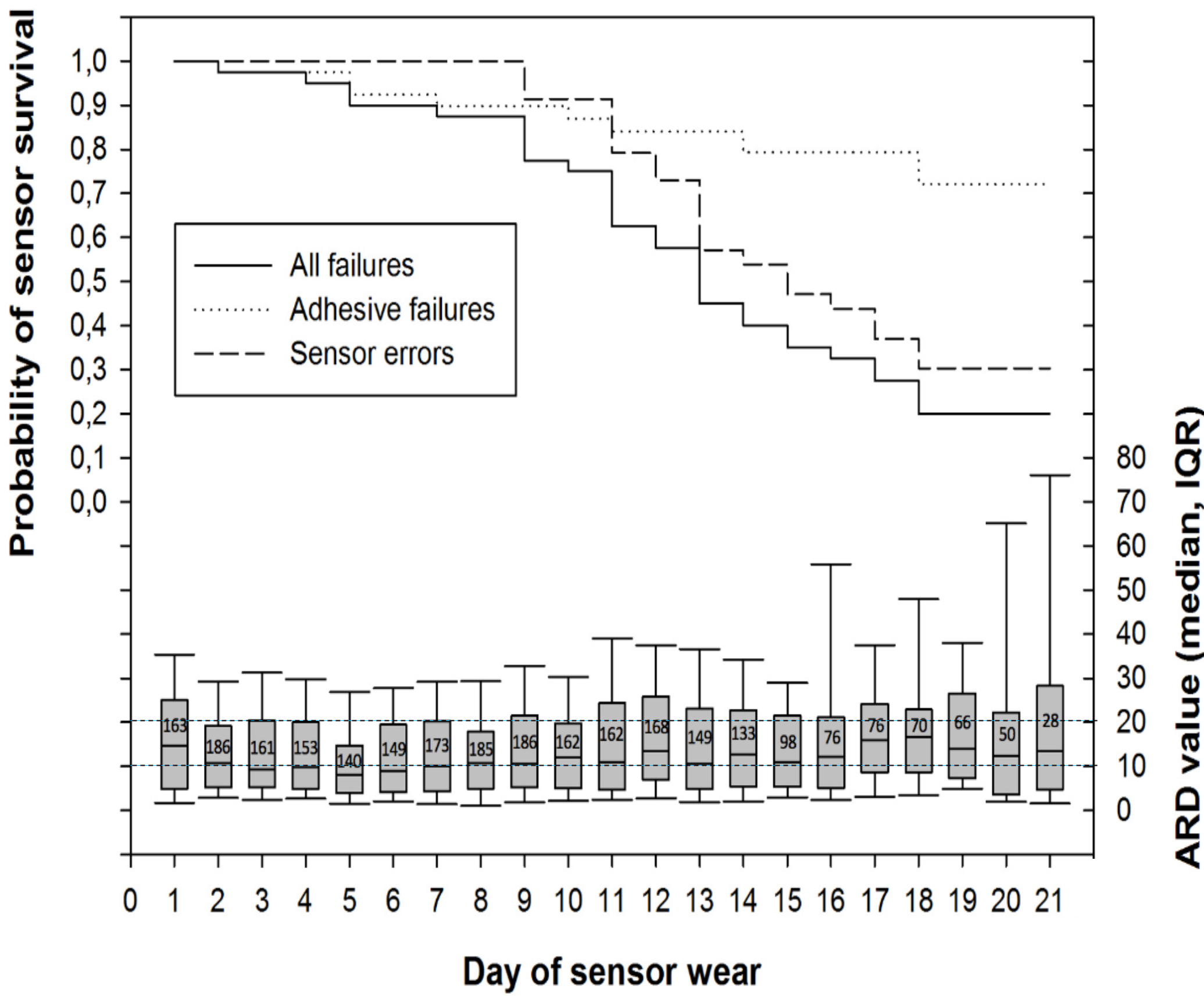
Conclusions

This study showed a significant decrease in sensors surviving into the third week of wear. Most failures were due to two hours of "???". Sensor accuracy was less robust in the third week.