Research Letter: Sensor-Based Systems and the Objective Measure of Physical Activity

Phillip Tuso, MD, FACP, FASN

Perm J 2015 Fall;19(4):89

http://dx.doi.org/10.7812/TPP/14-240

Recently the American College of Sports Medicine American Fitness Index revealed the percentage of Americans surveyed who met the Centers for Disease Control and Prevention aerobic activity guidelines for physical activity[1] was only 28%.[2] Unlike traditional vital signs, such as blood pressure, heart rate, and body mass index, activity is a vital sign that cannot be measured objectively in a physician's office. However, technology is now available that can objectively, and remotely, measure the activity of large populations accurately, reliably, securely, and efficiently.

At its annual conference in May 2014 in Orlando, FL, the American College of Sports Medicine used the sensor-based system (SBS), *Tractivity* (Kineteks Corporation, Vancouver, British Columbia, Canada), to measure physical activity of 300 health care professional attendees to demonstrate the possibility of using this system to monitor the physical activity of large patient populations. Before the conference, registered attendees were e-mailed an invitation to participate in a 3-day pilot of the new SBS technology during the conference. Upon arrival, participants were given the SBS device, which was activated via Bluetooth over the Internet. Once activated, each participant was randomly assigned to 1 of 8 teams. Activity (miles and steps per day) was gathered for individuals and teams. Individuals downloaded activity or accessed personal activity information on a smart phone, laptop, tablet, or personal computer. Team information was available at several conference locations. A unique feature was that activity was automatically uploaded using Bluetooth technology, even if the participant did not actively upload his/her activity. Table 1 shows the steps, miles, and rank of each team.

During the 3 days of the conference, participants averaged approximately 7000 steps per day (3 miles per day). Of 330 participants, 162 (49%) recorded at least 10,000 steps per day; 89 (27%) recorded more than 15,000 steps per day (Table 2). Not demonstrated in the data is the anecdotal observation of increased activity rates over time through competition.

Table 1. Team, rank, steps, and miles chart of sensor-based systems pilot at the 2014 American College of Sports Medicine conference

Team	Rank	Steps	Miles
A	#3	1,381,812	659
B	#6	1,233,298	582
C	#4	1,330,388	645
D	#8	1,040,844	503
E	#7	1,195,574	570
F	#1	1,524,978	734
G	#5	1,292,054	618
H	#2	1,518,416	729
Total		10,517,364	5040

Table 2. Goals achieved in the sensor-based systems pilot at the 2014 American College of Sports Medicine conference

Participants	Number (%)
Retrieved data into the system	330 (66)
Less than 5000 steps per day	104 (31)
5000 to 10,000 steps per day	64 (19)
10,000 to 15,000 steps per day	73 (22)
More than 15,000 steps per day	89 (27)
At least 10,000 steps per day	162 (49)

On the basis of the information we collected, activity is an objective, measurable vital sign of population health that can be monitored in real time. Activity-monitoring sensors continue to be made available, and it is probable that they will become commonplace in the future. The integration of these activity systems with the electronic medical record of large health care organizations will enable physicians to use this data to encourage patients. Similar to medication adherence, objective measures of physical activity may allow physicians to improve activity rates among individual patients and patient populations, which should improve health care outcomes. SBS may become a best practice for objective measurement of physical activity and the management of physical activity programs. Given the ease of tracking with these new devices and the ability to upload information automatically, SBS is a potentially powerful tool for physicians to measure and encourage physical activity in their patients, thus potentially preventing preventable disease and lowering health care costs. ❖

References

1. Physical activity: how much physical activity do adults need? [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; last updated 2004 Mar 3 [cited 2015 Jun 10]. Available from: www.cdc.gov/physicalactivity/everyone/guidelines/adults.html.
2. Chamness BE, Zollinger TW, Coffing JM, Thompson WR, Ainsworth BE, Lewis MN. Actively moving American to better health: 2015 health and community fitness status of the 50 largest metropolitan areas. Indianapolis, IN: American College of Sports Medicine American Fitness Index; 2015.

Phillip Tuso, MD, FACP, FASN, is a Nephrologist at the Antelope Valley Medical Center in CA. E-mail: phillip.j.tuso@kp.org.