Using an Activity Tracker in Hospitalized Pre-Heart Transplant Patients to Promote Faster Post-Operative Recovery

Holly M. Rodriguez MSN, RN, CCRN-CMC, RN-BC
Professional Practice Leader - Cardiac Intensive Care Unit

HOUSTON Methodist
DEBAKEY HEART & VASCULAR CENTER

Disclosures:

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- Funding for the activity trackers was provided by the *Brown Nursing Innovation Award*

Learning Objectives:

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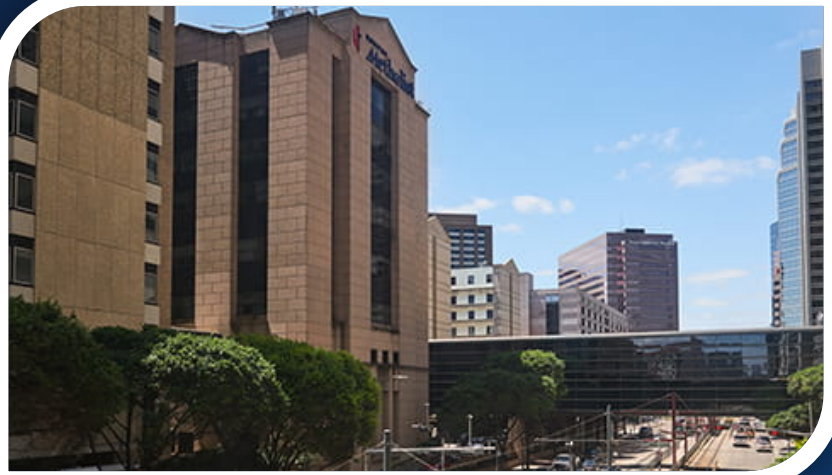
At the end of the presentation the participant will be able to:

1. **Describe** the design, implementation, and results of retrospective quasi-experimental research study aimed at reducing post-operative length of stay (LOS)
2. **Discuss** the incorporation of an activity tracker as a novel method of inpatient activity tracking
3. **Replicate** a similar project (incorporating technology) in their specialty area and/or institution

Study Purpose:

- To compare the post-operative recovery time between heart transplant patients who wore an activity tracker with those who did not (during their immediate pre-transplant hospitalization).



Study Location

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Houston Methodist Hospital (HMH)

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HMH, located in the Texas Medical Center has over 1,100 licensed beds, 7,200 employees and six Centers of Excellence.

BEST HOSPITALS U.S.News & WORLD REPORT HONOR ROLL 2022-23

HMH is recognized in the U.S. News & World Report prestigious Honor Roll as the No. 1 hospital in Texas, among the top 15 hospitals in the nation, and ranked in 10 adult specialties.

MAGNET RECOGNIZED AMERICAN NURSES CREDENTIALING CENTER

HMH is an American Nurses Credentialing Center (ANCC) Magnet Designated Center for Nursing Excellence since 2002, recently achieving 5th re-designation.

HMH offers 5 specialized ICUs and 2 IMUs totaling nearly 200 critical care beds focused on providing the best clinical care, advanced technology and patient experience.

Cardiac Intensive Care Unit (CICU)

Primary Study Location

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Unit

- 30-bed intensive care unit within HMH's DeBakey Heart & Vascular Center
- Diverse workforce including: 100 RNs, 19 PCAs, 2 MTs, 7 UAAs, 6 APPs, 1 Cardiology Fellow, 1 Cardiologist & 4 Intensivists.
- 50% of eligible nurses are board certified

Patient Population:

- Critically ill adult patient population with acute and/or acute exacerbations of preexisting chronic conditions
- Unique subgroup of advanced heart failure (AHF) patients who are New York Heart Association (NYHA) functional class 4. Often requiring Ionotropic and/or mechanical circulatory support (MCS) as a bridge to transplant (BTT)

Cardiovascular Intensive Care Unit (CVICU)

Secondary Study Location

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Unit

- 36-bed intensive care unit within HMH's DeBakey Heart & Vascular Center
- Diverse workforce including: 115 RNs, 19 PCAs, 9 ECMO Specialists, 9 UAAs, 2 MTs, 12 APPs, & 10 Intensivists
- 38% of eligible nurses are board certified

Patient Population:

- Critically ill adult surgical patients status post:
- Coronary artery bypass grafting (CABG), cardiac valve repair/replacement, transcatheter aortic valve replacement (TAVR), aortic aneurysm repair, ventricular assist device (VAD) implantation, heart/lung transplant, multi-organ transplant and various other vascular, pulmonary, and cardiothoracic surgical procedures

Study Overview:

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Background

Design and Criteria

Data Collection

Outcomes and Results

Background:

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- Heart failure (HF) is one of the top chronic diseases in the United States[1]
- The initial management is medication, lifestyle changes and guideline-directed medical therapy (GDMT)
- Patients who are refractory to GDMT are often candidates for inotropic or mechanical circulatory support (MCS) as a bridge to transplantation (BTT)
- At our tertiary center, the average pre-transplant ICU length of stay (LOS) is 49.5 days
- Patients admitted to the Cardiac Intensive Care Unit with advanced HF are often weak and deconditioned. They are also often dependent on intravenous ionotropic support and/or MCS

Background:

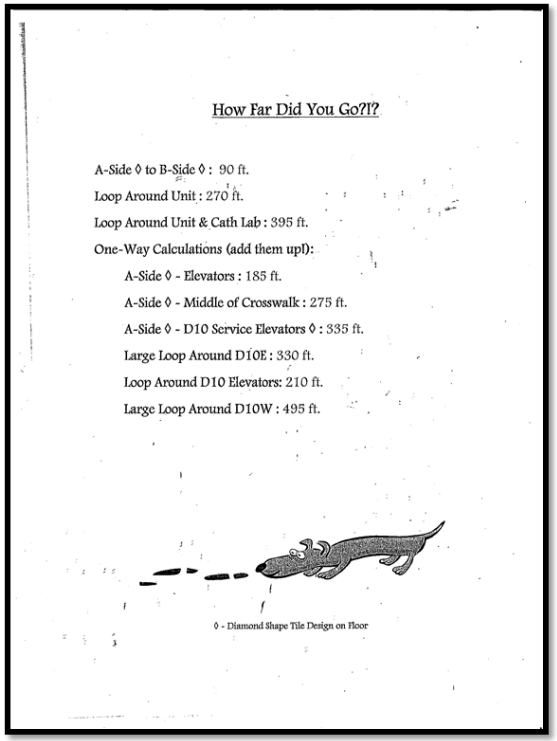
Pre-transplant HF patients are weak, fatigue easily, and experience shortness of breath with little exertion[3]

A lack of pretransplant conditioning can be illustrated through the concept of “frailty”.

The 1-year actuarial survival rate for frail patients after heart transplantation is 52%, compared to 100% in non-frail patients. Physical therapy and exercise are two interventions that can decrease frailty before the transplant. Ambulation is beneficial in preventing multiple complications[4]

Background:

- To reduce the level of frailty, the CICU nurses ambulate the patients for a total of 30 minutes twice per day.

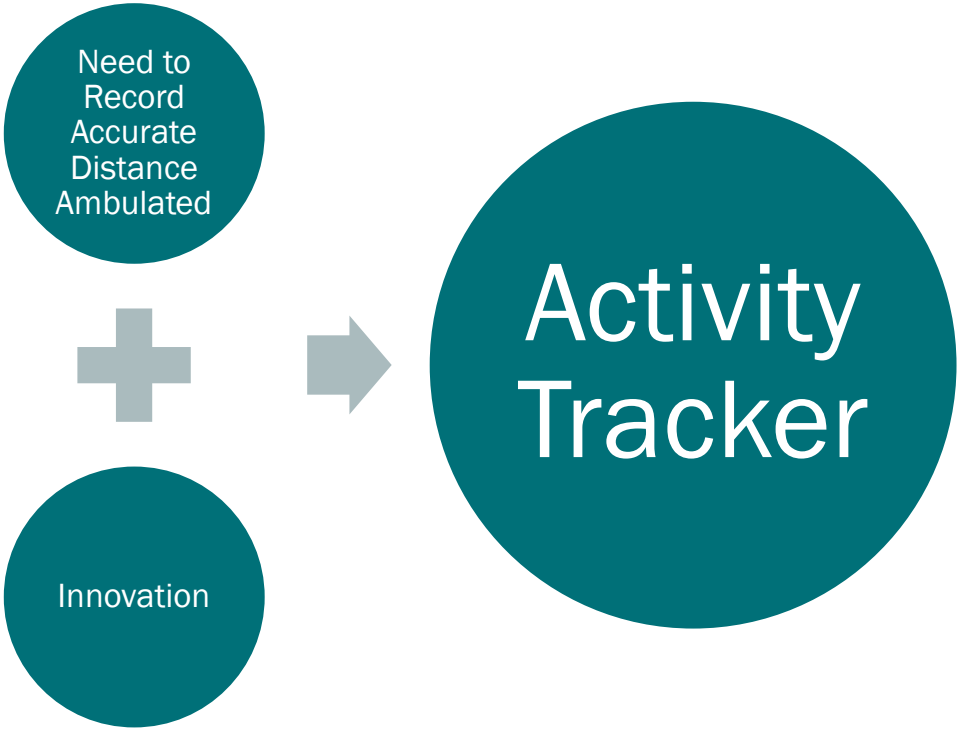


How Far Did You Go?!?

A-Side ◊ to B-Side ◊ : 90 ft.
Loop Around Unit : 270 ft.
Loop Around Unit & Cath Lab : 395 ft.
One-Way Calculations (add them up!):
A-Side ◊ - Elevators : 185 ft.
A-Side ◊ - Middle of Crosswalk : 275 ft.
A-Side ◊ - D10 Service Elevators ◊ : 335 ft.
Large Loop Around D10E : 330 ft.
Loop Around D10 Elevators: 210 ft.
Large Loop Around D10W : 495 ft.

◊ - Diamond Shape Tile Design on Floor

Background:


Need to Record Accurate Distance Ambulated
Innovation
Activity Tracker

Study Overview:

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Study Design:

- This study was a **retrospective quasi-experimental study** using electronic medical records (EMR) review of secondary data to compare the post-transplant recovery times of patients who wore an activity tracker pre-operatively with those of patients who did not wear an activity tracker pre-operatively

Study Design:

- Post-Transplant Recovery Time was operationalized by **seven** post-operative variables:
  - Time until extubation
  - Length of cardiovascular intensive care unit (CVICU) stay
  - Length of hospital stay
  - Time until:
    - Sitting on the side of the bed
    - Standing
    - Sitting in a chair
    - Ambulation of 10 or more steps

Sample (Intervention Group):

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- Between 2017 and 2018, following the hospital's Institutional Review Board (IRB) approval, 45 pre-operative heart transplant patients were approached to be in the activity tracker group and were consented to participate in a qualitative study.

Sample (Intervention Group):

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The patients were provided with an activity tracker that they could keep.

They were instructed to wear it every day during their waking hours throughout their preoperative hospital stay.

Note: 2 patients had to be dropped from the study due to: one patient not having a smartphone/computer required for use of the activity tracker and the other having a transplant before the 2-week minimum wait period.

Sample (Control Group):

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- Medical records were chosen consecutively for:
  - 43 patients who had an activity tracker
  - 45 patients from the same CICU who did not wear an activity tracker preoperatively (Control group)

Inclusion Criteria:

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- In-patient
- A pre-heart transplant adult on the 1A United Network for Organ Sharing (UNOS) transplant list
- Orders to Ambulate
- Vasopressor/inotropic support/pulmonary artery catheter and/or intra-aortic balloon pump

Study Overview:

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Background

Design and Criteria

Data Collection

Outcomes and Results

Data Collection:

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Researchers used the electronic medical records (EMR's) to collect data from the activity tracker patients and the comparison group

A custom questionnaire with a total of 40 items was developed by the research team to measure each of the 7 variables plus demographic data, body mass index (BMI), transplant wait times and comorbidities

Study Overview:

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Background

Design and Criteria

Data Collection

Outcomes and Results

Outcomes/Results:

Three out of seven hypotheses were statistically significant at the .05 alpha level.

The three hypotheses that were significantly different in favor of wearing an activity tracker before a heart transplant were:

1. Time till sitting on the side of the bed (Mann Whitney U, p = .040).

2. Time till standing by the side of the bed (Mann Whitney U, p = .019)

3. Length of stay in the CVICU (Mann Whitney U, p = .008).

Outcomes/Results:

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Dependent Variable	Fitbit = 1 Non-Fitbit = 2	N	Mean	Std. Deviation	Median	Rank	p value
Post transplant ICU LOS (in days*)	1	41	7.27	5.00	6	35.22	.008*
	2	43	9.63	6.62	9	49.44	
Post-Transplant Hospital Length of Stay in days	1	41	21.32	7.50	19	39.46	.264
	2	43	24.93	11.78	23	45.40	
Extubation Time (in hours)	1	40	21.35	25.30	14	40.63	.616
	2	43	30.28	37.53	12	43.28	
Sit on side of the bed (dangle) in hours	1	40	47.80	32.93	37	35.96	.040*
	2	42	85.79	101.36	39	46.77	
Stand by the side of the bed in hours*	1	40	48.35	32.72	41	35.19	.019*
	2	42	89.19	101.27	40	47.51	
Ambulate to the chair in hours	1	40	63.80	95.93	44	36.44	.085
	2	41	90.93	113.18	43	45.45	
Ambulate at least 10 feet in hours	1	40	123.58	106.62	102	40.20	.479
	2	36	99.17	50.51	98	36.61	

Conclusion:

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The results of this study suggest the use of an activity tracker for measuring and motivating activity and ambulation in pre-heart transplant patients may have post-operative benefits.

Compared to the other group, activity tracker patients had significant post-operative differences in the time till sitting on the side of the bed, standing, and decreased CVICU length of stay.

With the estimated total charge of $1,664,800 for a heart transplant, and ICU stay costing $2,325 to $5,166 per day in the U.S., any decrease in ICU and hospital stay is significant.[1]

Conclusion:

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- Larger studies are needed to further examine the benefits of activity trackers in pre-heart transplant ICU patients.

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Questions:

Scan QR Code to Email Additional Questions

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Holly M. Rodriguez
CICU PPL

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