

**The right measures at the right time:  
use and interpretation of appropriate  
measures in the acute phase  
following arthroplasty**

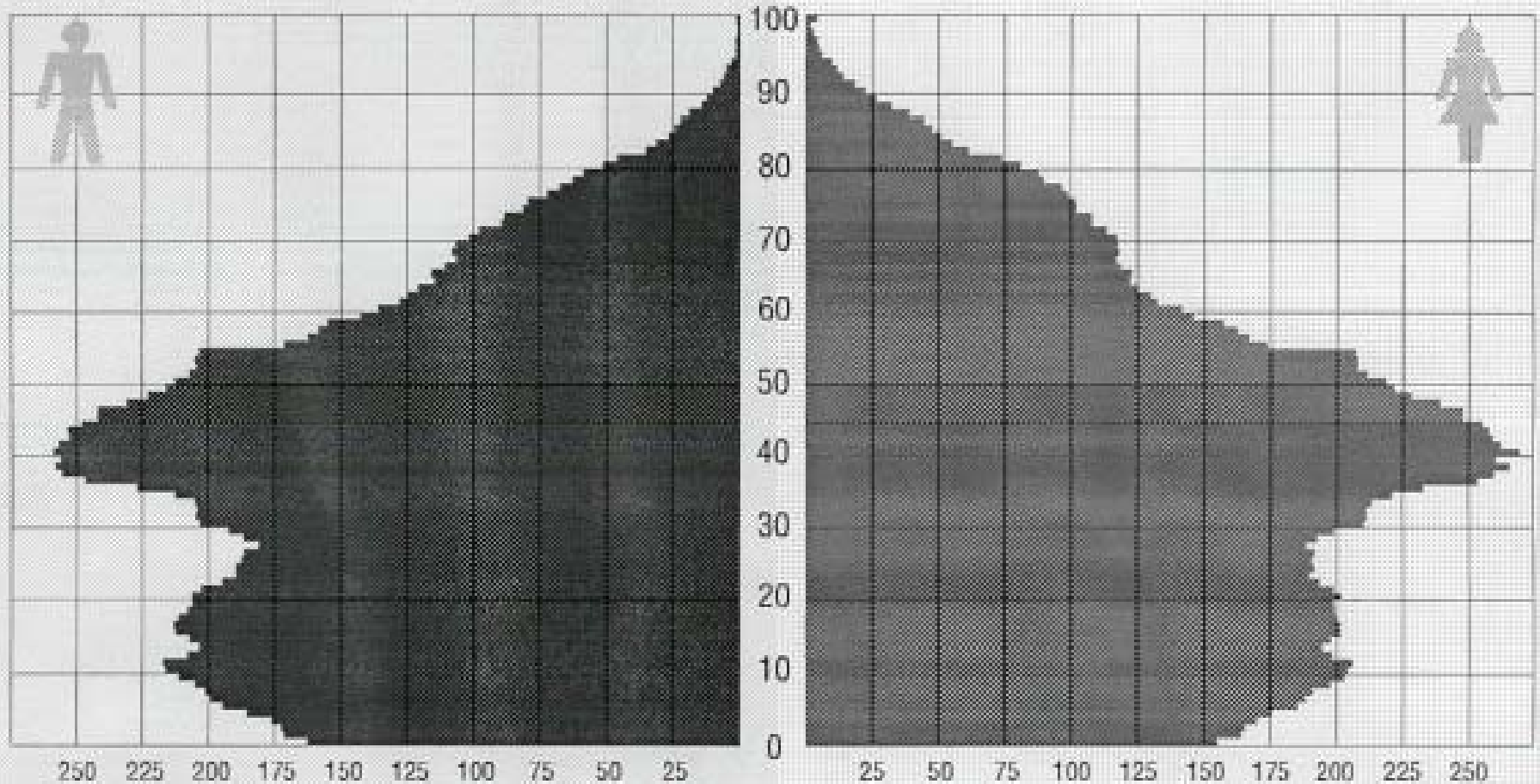
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June 20, 2008

# Age Pyramid of Population of Canada July 1, 1901 - 2001

(Shown in 000's)

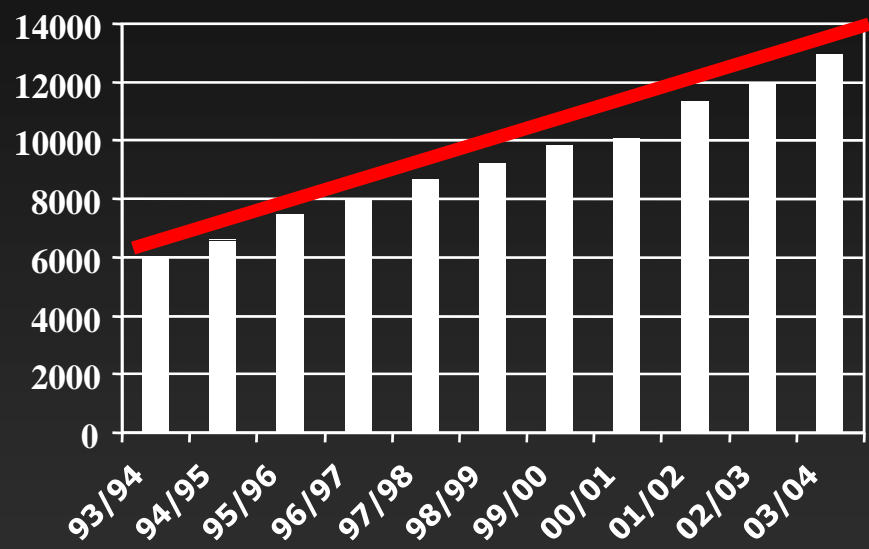
2001

30 Million

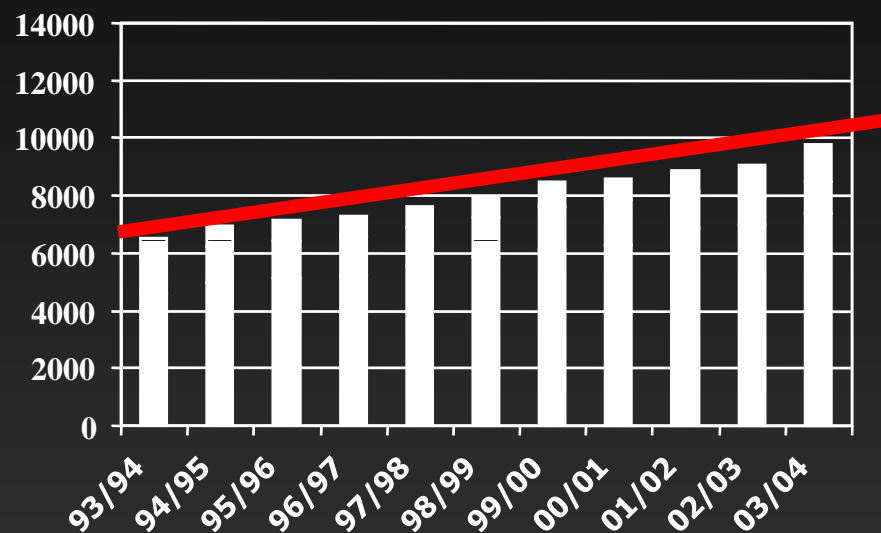


Source: Statistics Canada website, [www12.statcan.ca/english/census01/home/index.cfm](http://www12.statcan.ca/english/census01/home/index.cfm)

## TKA: Knee Replacement Surgeries



## THA: Hip Replacement Surgeries



1993/94 to 2003/04

Limited resources  
Increased accountability



Increased demands to demonstrate effectiveness



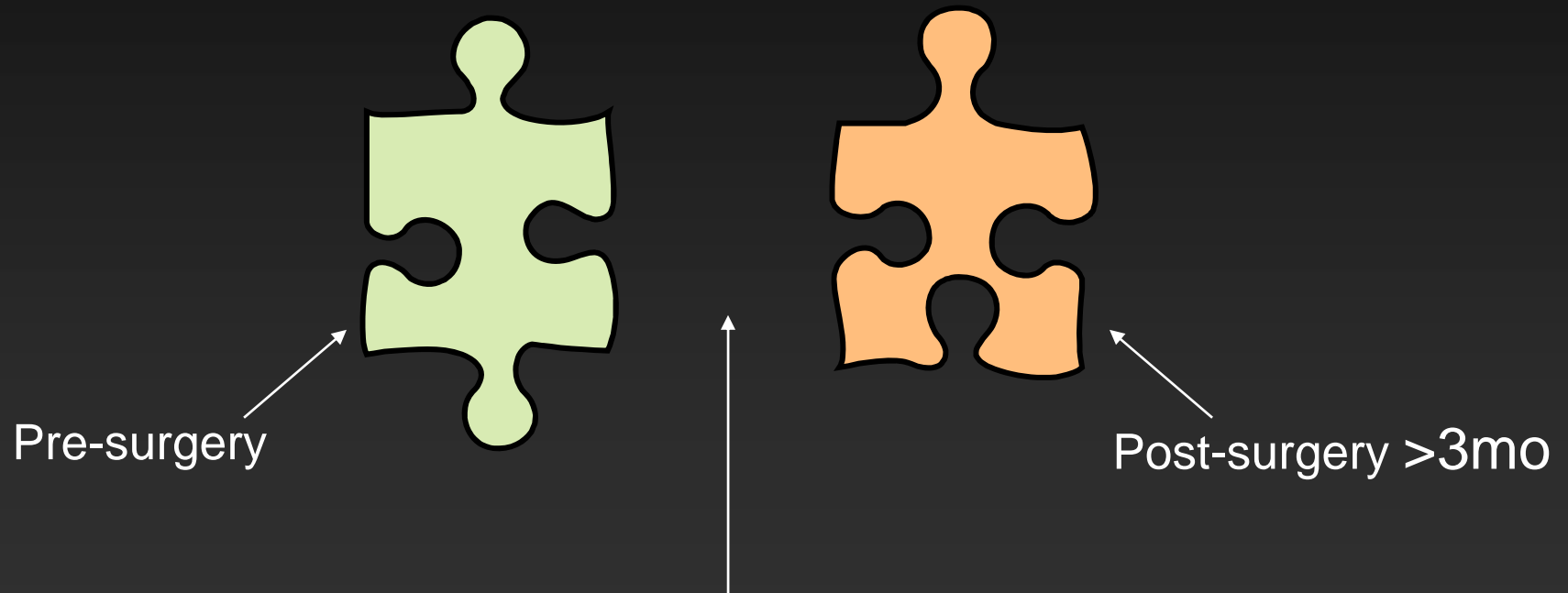
Use of appropriate  
outcome measures is essential

# Appropriate Meaning....

- Good psychometric properties
- Sensitive to time frame of treatment
- Patient centered

# What is Important to Patients?

## Summary of Literature



No one has identified what is important to patients in the first 6 weeks following primary TKA

# Concerns Mapped to Outcome Measures

Outcome Measure	KOOS	WOMAC	LEFS	Oxford
Total concerns covered by outcome measure (%)	14/32 (44%)	11/32 (34%)	11/32 (34%)	4/32 (13%)

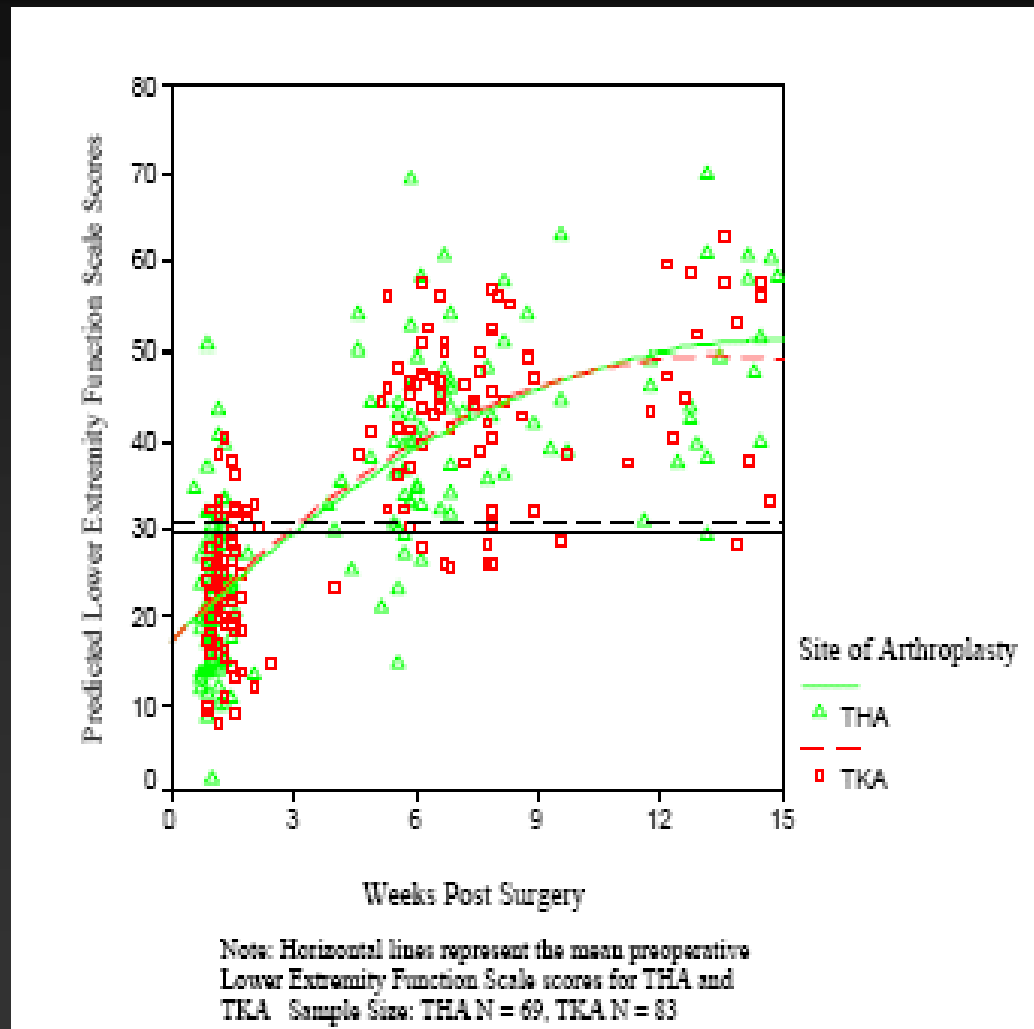
# Outcome Measures Following TJA

- Performance-based measures
  - TUG, 6 MWT .....
- Self-report measures
  - KOOS, WOMAC, LEFS, Oxford Knee Scale.....



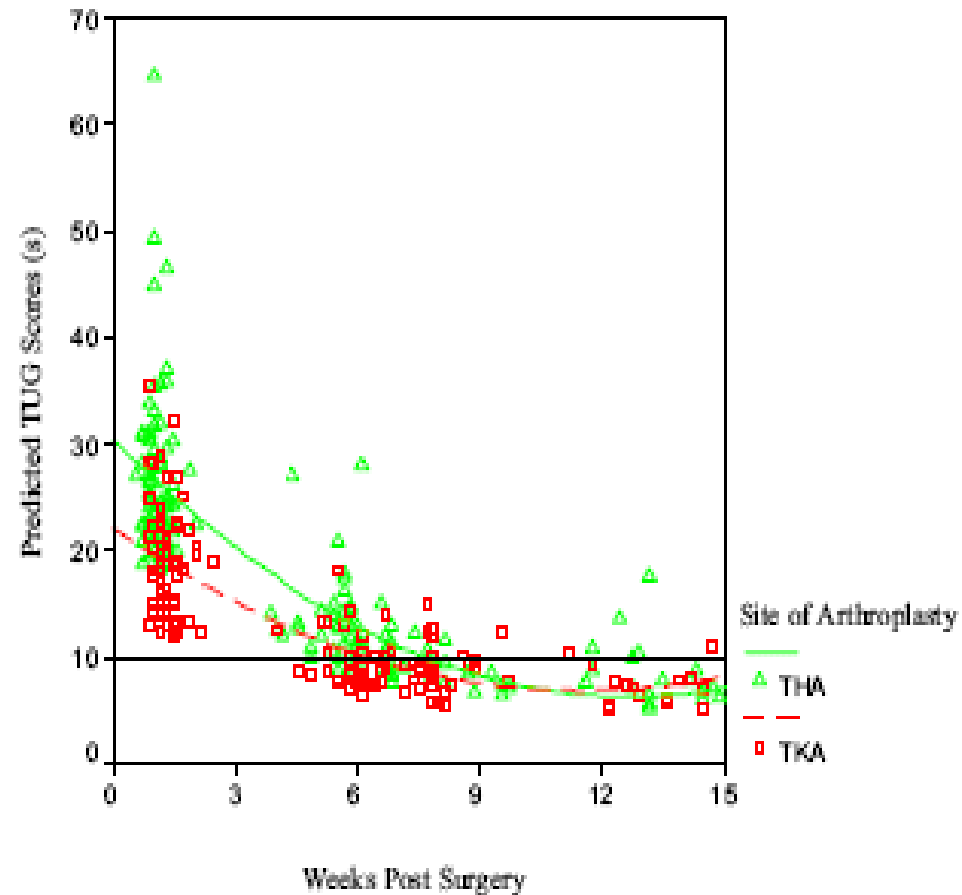
# Recovery Curves

## Self-Report Measures



# Recovery Curves

## Performance Measures



Note: Horizontal line represents the mean preoperative timed up and go times for both THA and TKA  
Sample Size: THA N = 69, TKA N = 83

## Question?

Which outcome measures should we currently use in the acute phase following TJA?

## We made the decision based on....

- Our study of patient concerns (Health Qual Life Outcomes 2007, 5: 48)
- Validation of LEFS (Physiotherapy Canada 2000, 52:97-105)
- Validity of LEFS > WOMAC PF (J Clin Epidemiol. 2004, 57:1025-1032)
- LEFS easy to administer and published data on interpretation of scores (Physiotherapy Canada 2005, 57:154-162)
- TUG easy and quick to administer and preferred over 6 MWT in acute post-op phase (BMC Musculoskeletal disorders 2005,6:3)

# Lower Extremity Functional Scale (LEFS)

Today, do you or would you have any difficulty at all with:

*(Circle one number on each line)*

Activities	Extreme Difficulty or unable to perform activity	Quite a bit of difficulty	Moderate difficulty	A little bit of difficulty	No difficulty
a. Any of your usual work, housework or school activities.	0	1	2	3	4
b. Your usual hobbies, recreational or sporting activities	0	1	2	3	4
c. Getting into or out of the bath.	0	1	2	3	4
d. Walking between rooms.	0	1	2	3	4
e. Putting on your shoes or socks.	0	1	2	3	4
f. Squatting.	0	1	2	3	4
g. Lifting an object, like a bag of groceries from the floor.	0	1	2	3	4
h. Performing light activities around your home.	0	1	2	3	4
i. Performing heavy activities around your home.	0	1	2	3	4
j. Getting into or out of a car.	0	1	2	3	4
k. Walking 2 blocks.	0	1	2	3	4
l. Walking a mile.	0	1	2	3	4
m. Going up or down 10 stairs (about 1 flight of stairs).	0	1	2	3	4
n. Standing for 1 hour.	0	1	2	3	4
o. Sitting for 1 hour.	0	1	2	3	4
p. Running on even ground.	0	1	2	3	4
q. Running on uneven ground.	0	1	2	3	4
r. Making sharp turns while running fast.	0	1	2	3	4
s. Hopping.	0	1	2	3	4
t. Rolling over in bed.	0	1	2	3	4
<b>COLUMN TOTALS</b>					

# Guidelines for completing missing items on the LEFS

## Group 1: Hardest Activities

Running on uneven ground

Making sharp turns while  
running fast

Running on even ground

Hopping

Walking a mile

## Group 2: Moderately Difficult Activities

Your usual hobbies, recreational  
or sporting activities

Squatting

Standing for 1 hour

Performing heavy activities  
around your home

Going up or down 10 stairs

## Group 3: Moderately Easy Activities

Any of your usual work,  
housework, or school activities

Walking 2 blocks

Lifting an object, such as a bag  
of groceries from the floor

Getting into or out of a car

Getting into or out of the bath

## Group 4: Easy Activities

Performing light activities  
around your home

Sitting for 1 hour

Rolling over in bed

Putting on your shoes or socks

Walking between rooms

- 16 items must be answered
- no more than 2 missing items from each group
- to score the missing item average the score of the two closest items identified in the hierarchy table
- if the most difficult item response (run uneven) is missing assign the score of the closest answered item
- If the easiest item response (walk b/w rooms) is missing assign the score of the closest answered item

# Timed Up and Go Test (TUG)

1. Equipment: Chair with arms, tape measure, tape and stop watch
2. Begin the test with the subject sitting correctly in a chair with arms. The subject's back should be resting on the back of the chair.
3. Place a piece of tape or other marker on the floor in front of the subject and 3 metres away from the chair so that it is easily seen by the subject. The subject must have both feet behind the marker.
4. Instructions: On the word "GO" you will stand up, walk past the line on the floor, turn around and walk back to the chair and sit down. Walk at your regular speed.
5. Start timing on the word "GO" and stop timing when the subject is seated again correctly in the chair with their back resting on the back of the chair
6. The subject wears their regular footwear, may use any gait aid that they normally use during ambulation, but may not be assisted by another person. There is no time limit. They may stop and rest (but may not sit) if they need to.

# Measurement Properties

<u>Outcome measure</u>	LEFS	TUG	6 MWT
Confidence in Score (90%)	± 6	± 1.76 s	± 43.4 m
MDC (90%)	9	2.49 s	61.3 m
SEM	3.5	1.07 s	26.3 m
Reliability	0.85	0.75 – 0.97	0.94

Kennedy DM, Stratford PW et al. Physical Therapy, Jan 2008, Vol 88, No.1

Kennedy DM, Stratford PW et al. BMC Musculoskeletal Disorders 2006, 7:100

Podsiadlo D and Richardson S. JAGS, Feb 1991, Vol 39, No. 2



# Measurement Properties

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# Clinical Example

- 68-year-old female referred to you at post-op week 2 following primary TKA

- On Initial Assessment :

LEFS = 28 , TUG = 35 seconds 6MWT = not done

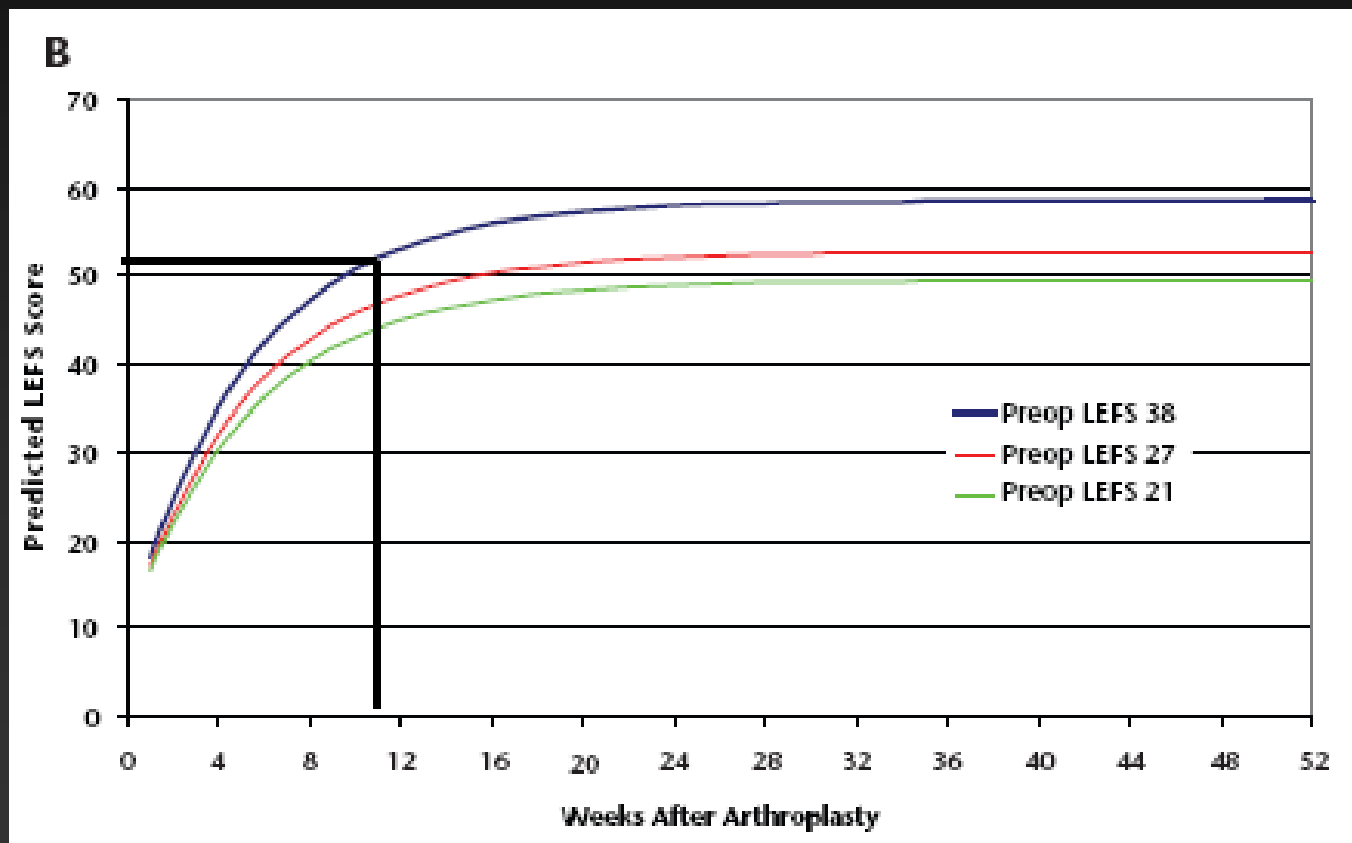
- Progress note from The Arthritis Society (pre-operatively) :

LEFS = 40 , TUG = 10 seconds 6MWT = 375 m

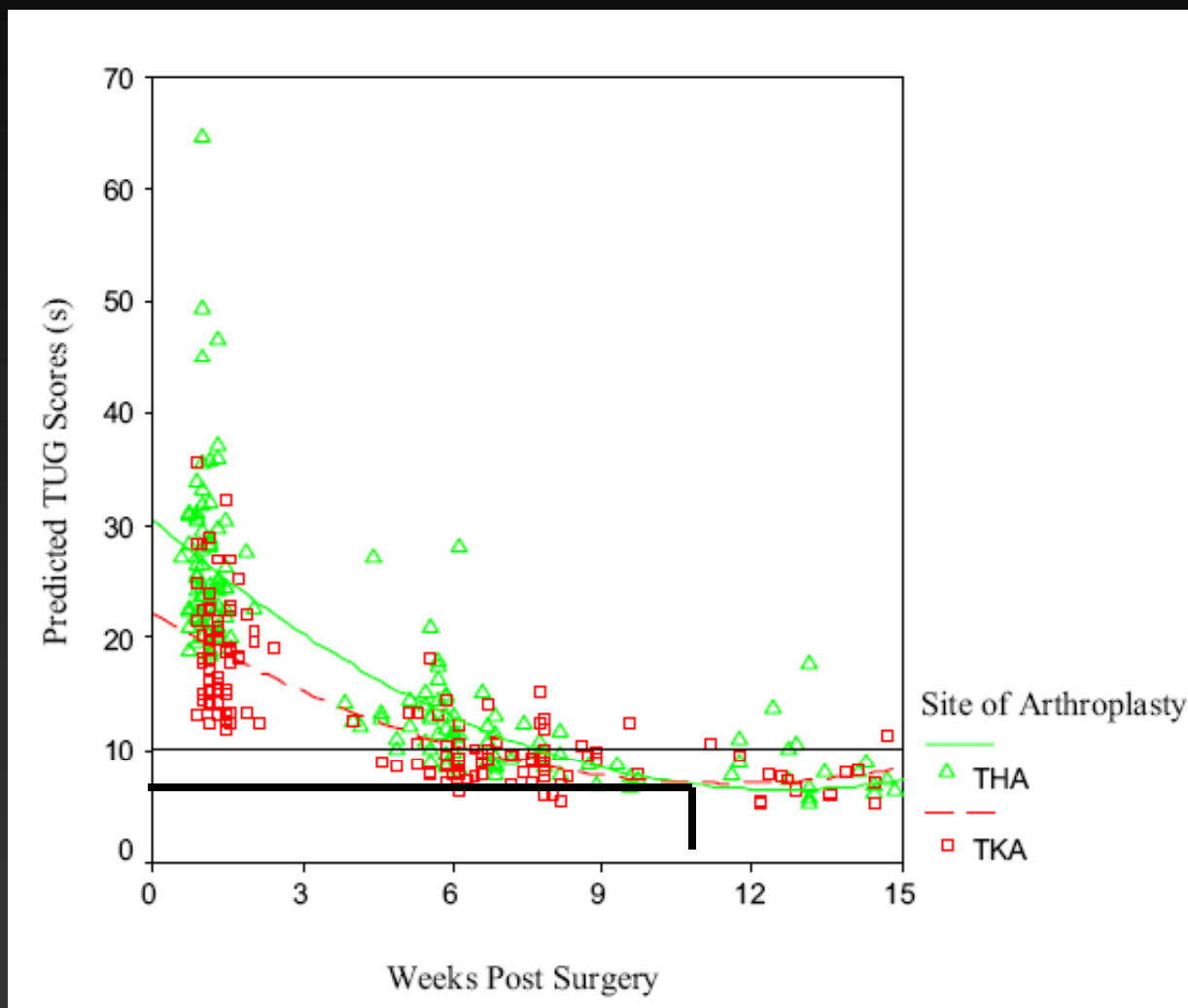
# Questions?

- I want to go and visit my Grandchildren in Hawaii in 9 weeks. Will I be able to do this?
- What do you think will be my maximal function and when will I be able to achieve that?

# What is her lower extremity functional status likely to be in 9 weeks?

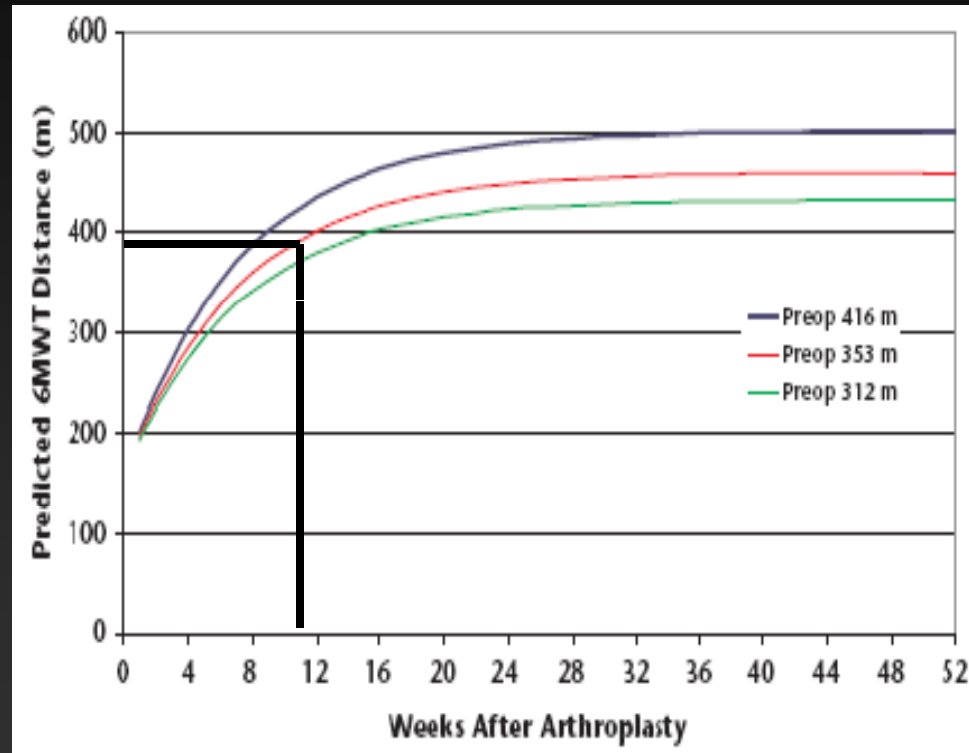


# What is her lower extremity functional status likely to be in 9 weeks?

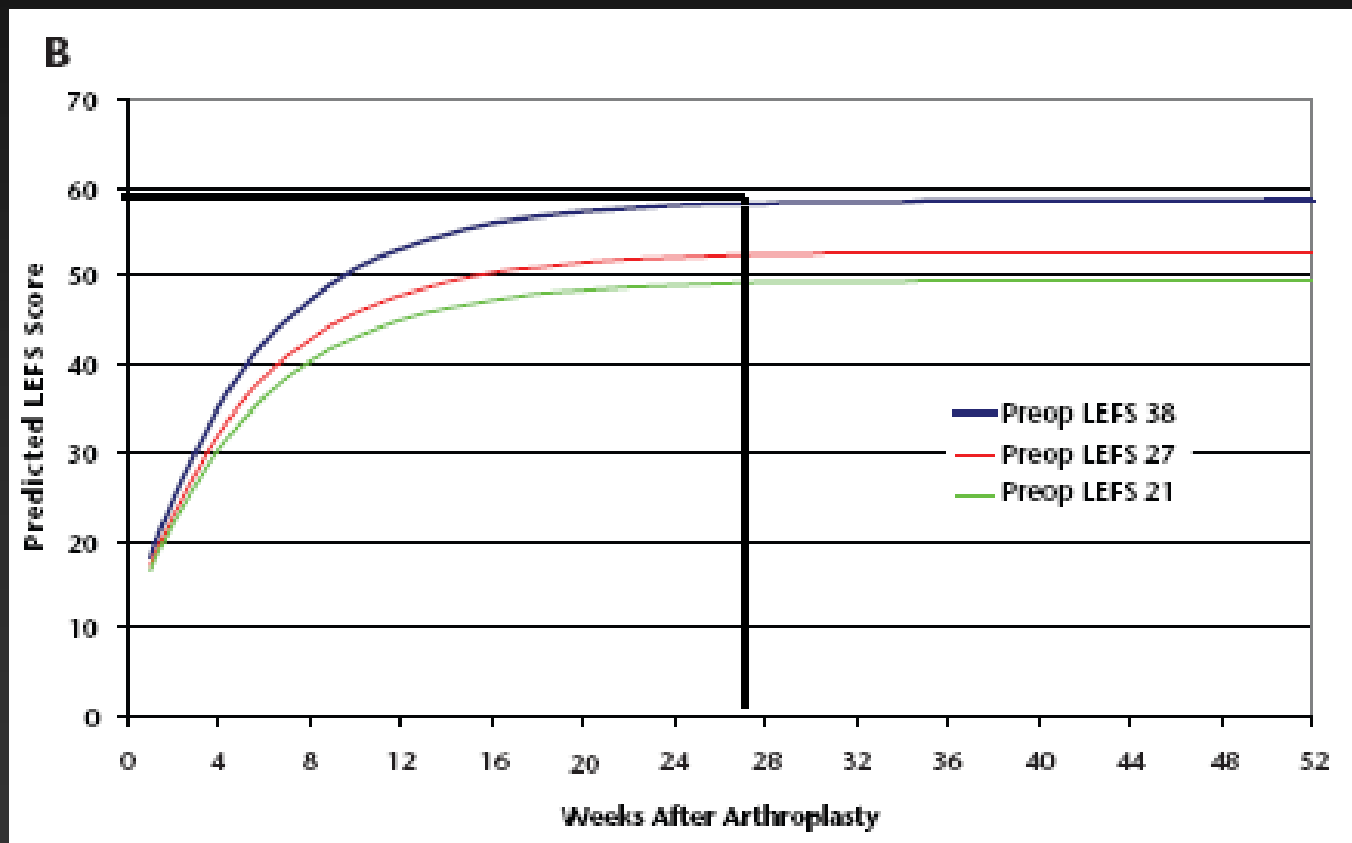


Kennedy DM, Stratford PW et al. BMC Musculoskeletal Disorders 2006, 7:100

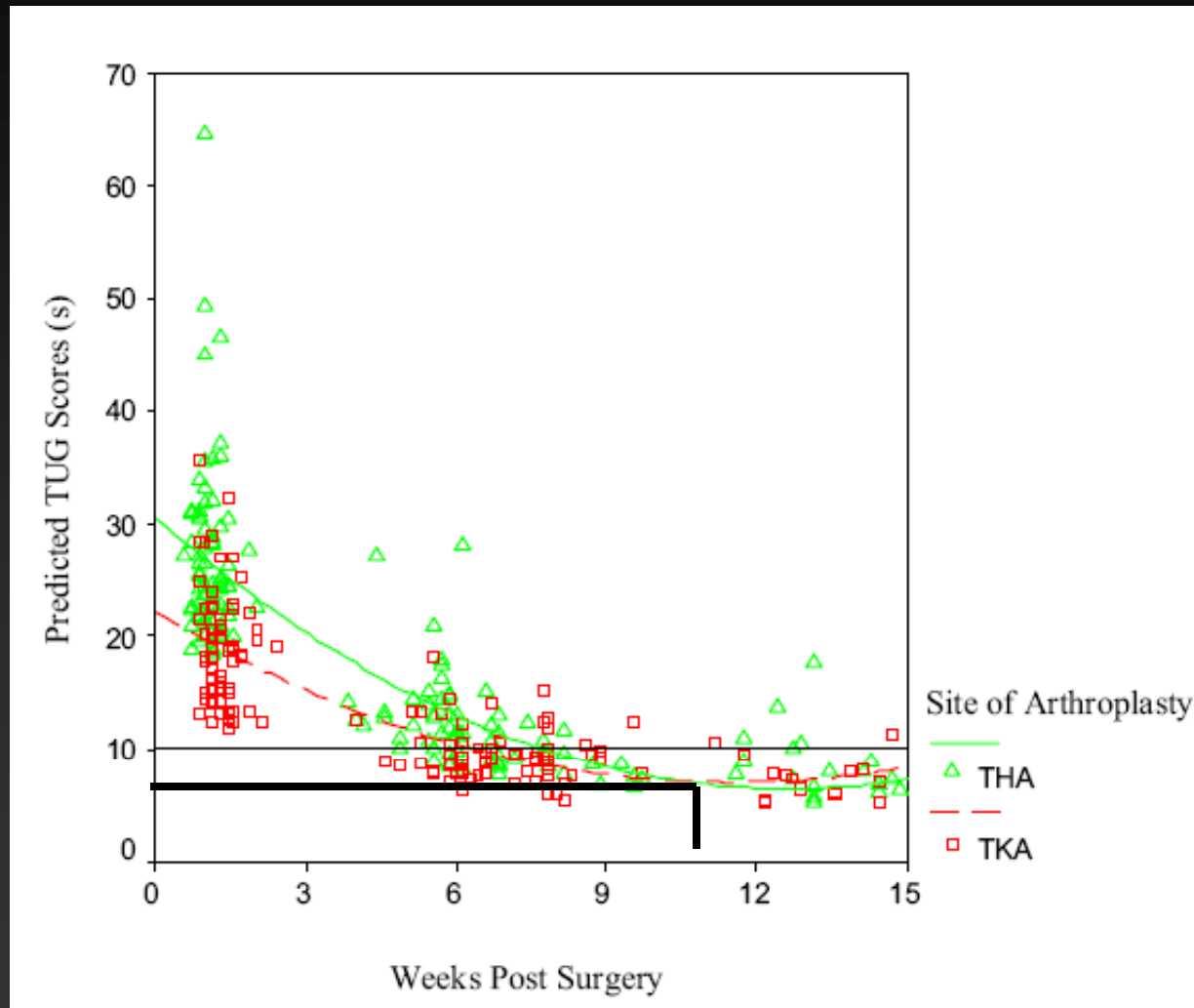
# What is her lower extremity functional status likely to be in 9 weeks?



# What is her maximum lower extremity functional status likely to be?



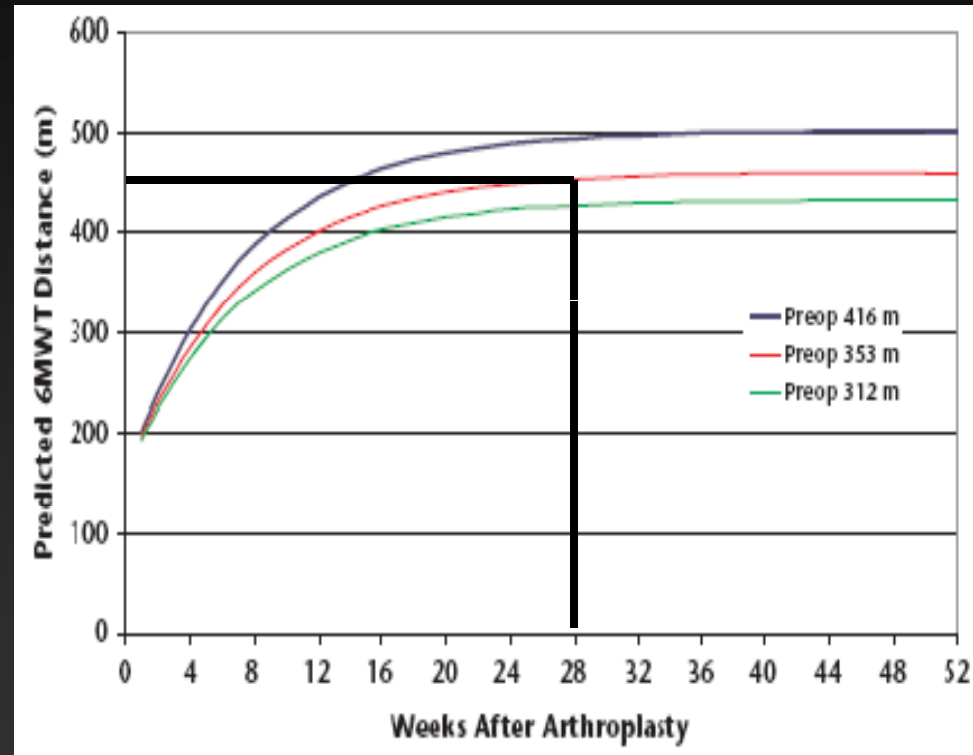
# What is her maximum lower extremity functional status likely to be?



Kennedy DM, Stratford PW et al. BMC Musculoskeletal Disorders 2006, 7:100



# What is her maximum lower extremity functional status likely to be?



# Interpreting LEFS Scores

**Table 3** Typical Activity Profile for LEFS Total Scores

LEFS Score	Quite a Bit of Difficulty	Moderate Difficulty	A Little Bit of Difficulty	No Difficulty
80				Run uneven Sharp turns Run even
75				
70			Run uneven Sharp turns	Heavy activities Walk 1 mile
65			Run even	Stairs Walk 2 blocks
60			Walk 1 mile Heavy activities	Light activities Get in/out bath
55		Run even	Stairs	
50				
45		Walk 1 mile Heavy activities	Walk 2 blocks	
40			Light activities Get in/out bath	
35		Stairs Walk 2 blocks		
30	Heavy activities Stairs Walk 2 blocks		Walk rooms	
25				
20		Get in/out bath Light activities		
15		Walk rooms		
10	Get in/out bath Light activities			
5	Walk rooms			
0				

LEFS = Lower Extremity Functional Scale.

# Interpreting TUG Scores

10-12 seconds = Normal

20-29 seconds = Ambulation generally with cane, indep indoors, approx 25% go out alone

> 30 seconds = Mobility problems

## Gait speed

< 20 secs = > 0.5 m/sec

0.5 m/sec = Minimum required time to cross the street

# Questions?

- I want to go and visit my Grandchildren in Hawaii in 9 weeks. Will I be able to do this?

At 11 weeks post-op LEFS = 52, 6 MWT = 375 m TUG <10 sec

- You will likely be able to walk without gait aids
- You will have moderate to little difficulty walking a mile (~ 25 min)
- You will have little to no difficulty with daily household activities

# Questions?

- What do you think will be my maximal function and when will I be able to achieve that?

(max LEFS = 60, max 6 MWT = 450 m, TUG < 10 sec)

- You are likely to reach your maximal function by 6-7 months after your surgery
- You should have very little difficulty in walking a mile (~ 21.5 min)
- You should have little difficulty with running across the street if required
- You should have no difficulty with daily household activities

# Summary

## Outcome Measures being administered at LHSC

- Numeric Pain Rating Scale
- LEFS
- TUG
- Patient Specific Functional Scale (PSFS)

Thank You

