Direct Socket for Trans-femoral amputees:

for whom, how many are they and what are the requirements?

Anton Johannesson

CPO, PhD

ÖSSUR Clinics

11. NORDISKE BANDAGIST KONGRES
KØBENHAVN 6.-8. SEPTEMBER 2018

This presentation includes

I. The mission: Improving the process for TF amputees
II. Who are they and how many?
- Some statistics
- What does it tell us?
- The questions that arise?

III. From artistic approach to standardised method
    I. Direct Socket for TF amputees
        I. Background
        II. The development process
        III. ISO description of the socket
        IV. Outcomes, so far…
    II. What is the next step….?

Disclosure

Anton Johannesson have the following financial disclosures:

employ of ÖSSUR Scandinavia since 2013

Current position: Clinical Manager Prosthetics, Össur Clinics

ÖSSUR®

LIFE WITHOUT LIMITATIONS

I. The mission: Improving the process for TF amputees (in the Nordic countries)

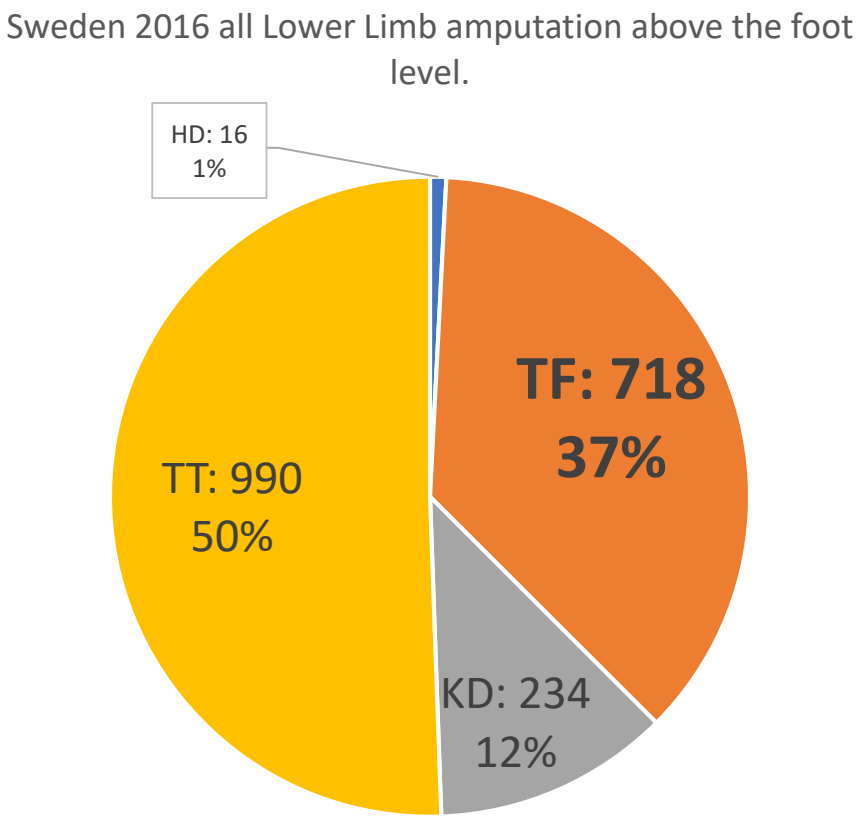
Who are they and how many?

In 2016:

-Sweden 10 millions	**718**
-Norway 5.2 millions	373
-Denmark 5.6 millions	402
-Finland 5.5 millions	395
-Iceland 0.35 millions	20

In total:

1908 new TF amputees in 2016 in the Nordic countries (estimation)



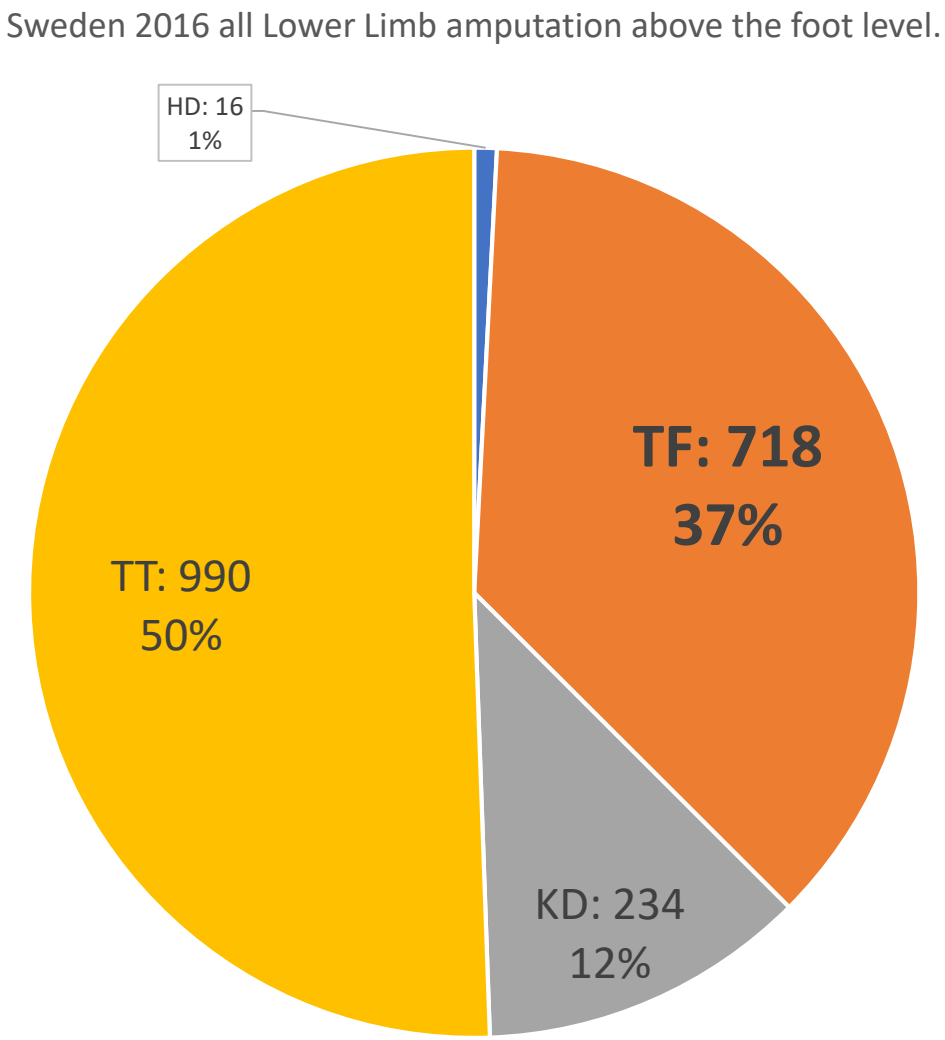
II. Who are they and how many (in Sweden)?

Population in Sweden 10 millions

In total:

1958 new LLA in 2016

718 persons with TF initial amputation



II. Who are they and how many (in Sweden)?

In total 2016:

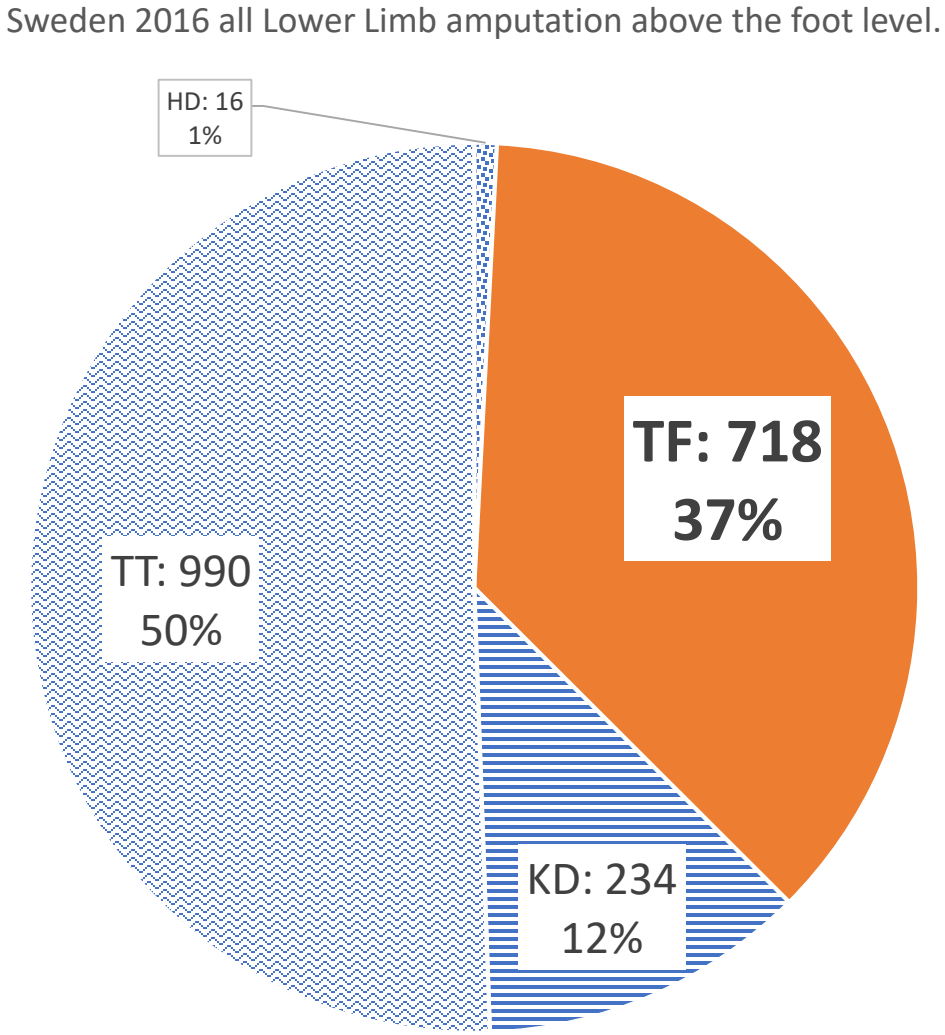
718 persons TF initial amputation (persons)

56% of the older than 80 yr

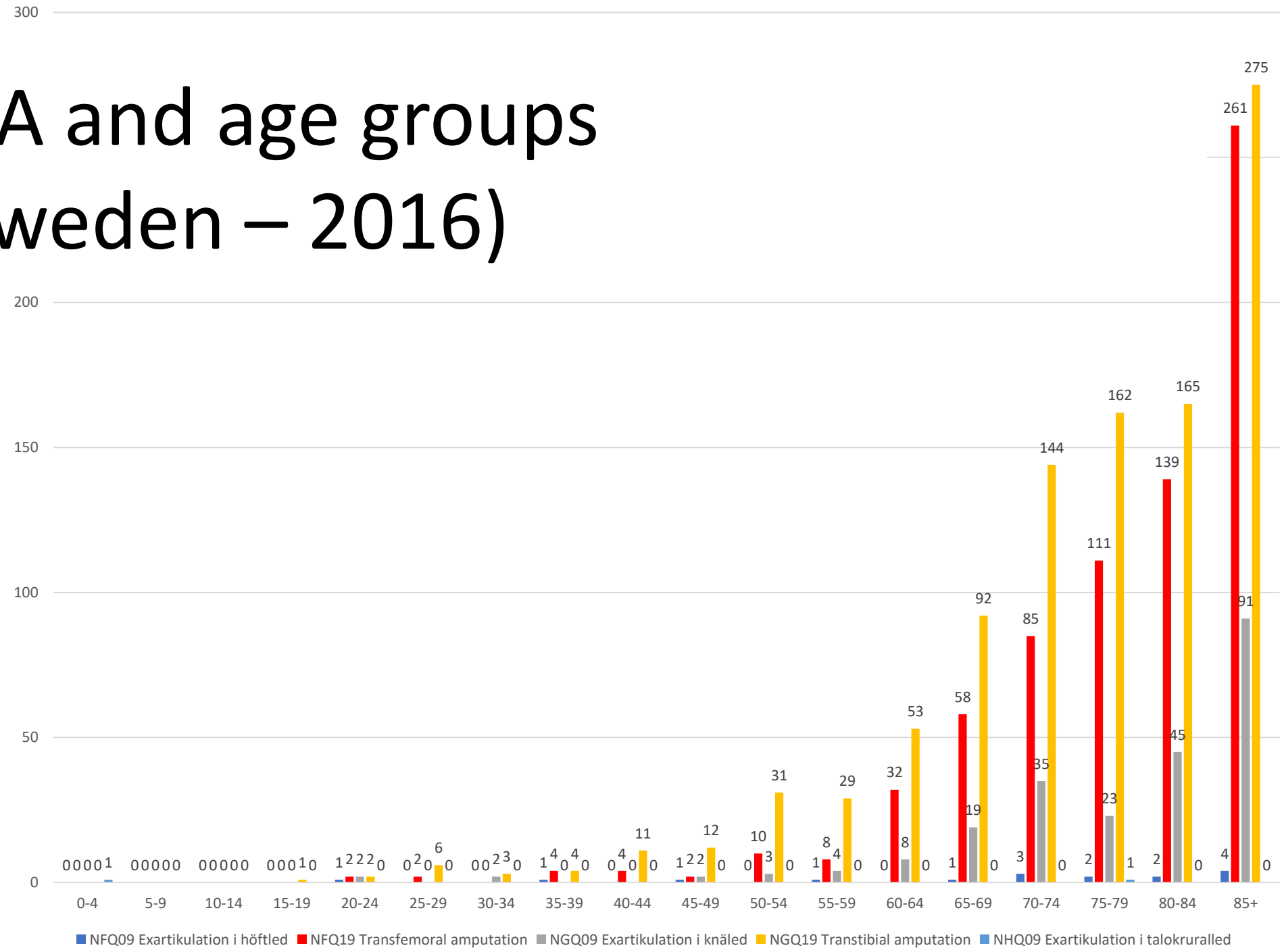
9% (64) were younger than 65 yr

2% (14) were younger than 50 yr

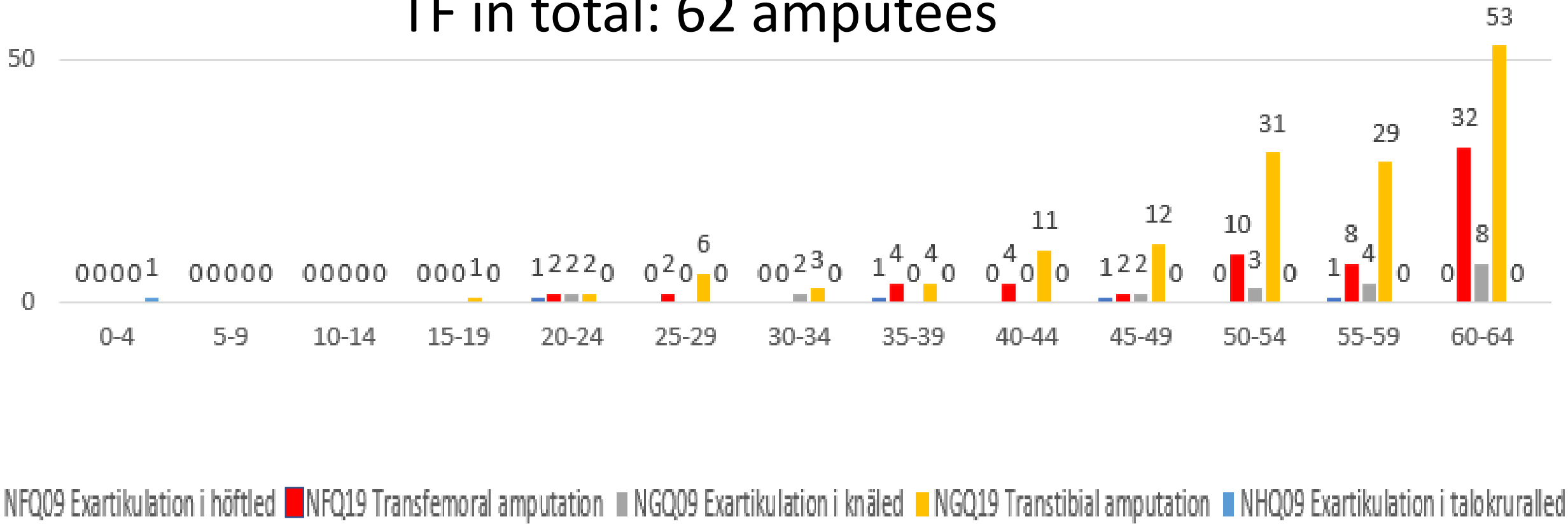
0% (0) of them was ≤ 19 yr



LLA and age groups (Sweden – 2016)



”Young” new amputees in Sweden 2016



….so there is no young amputees to be fitted with prosthesis….

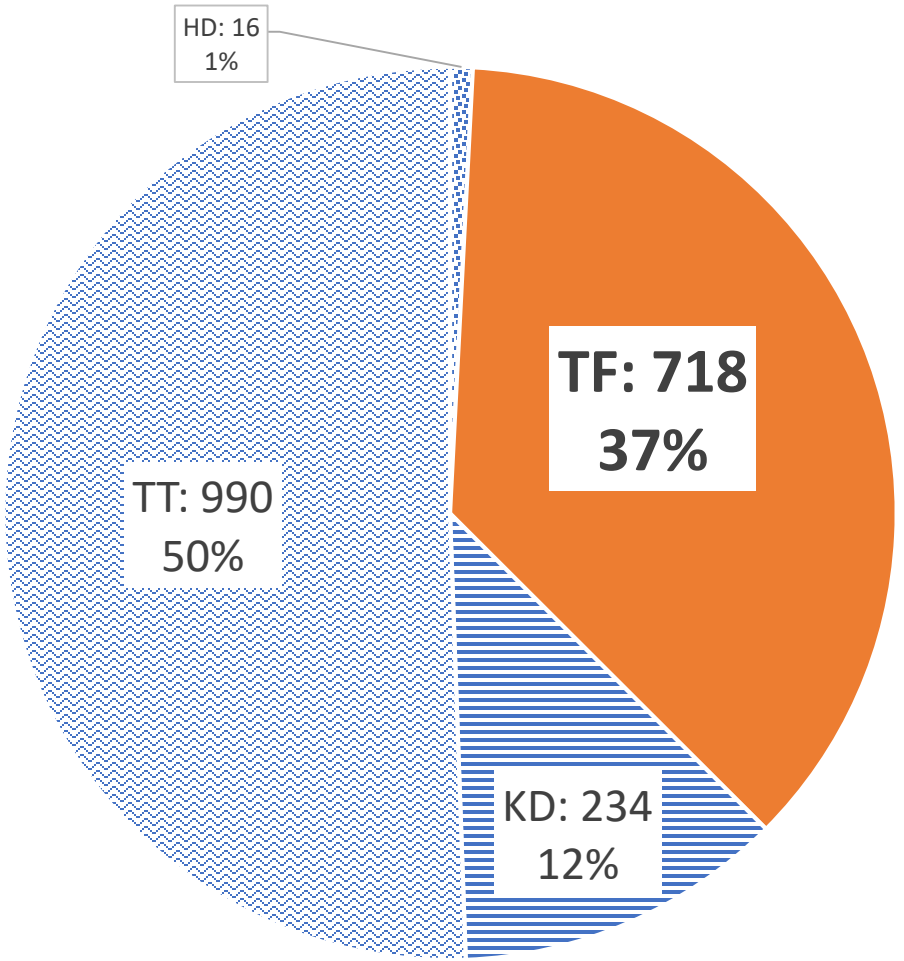
II. Who are they and how many (in Sweden)?

718 persons TF initial amputation (persons)

56% of them older than 80 yr

Only between 15-25% are provided with prosthesis on this level…*

Sweden 2016 all Lower Limb amputation above the foot level.



*SWEDAMP: Årsrapport 2016

*SPARG:A Survey of the Lower Limb Amputee Population in Scotland, 2011

II. Who are they and how many (in Sweden)?

718 persons TF initial amputation (persons)

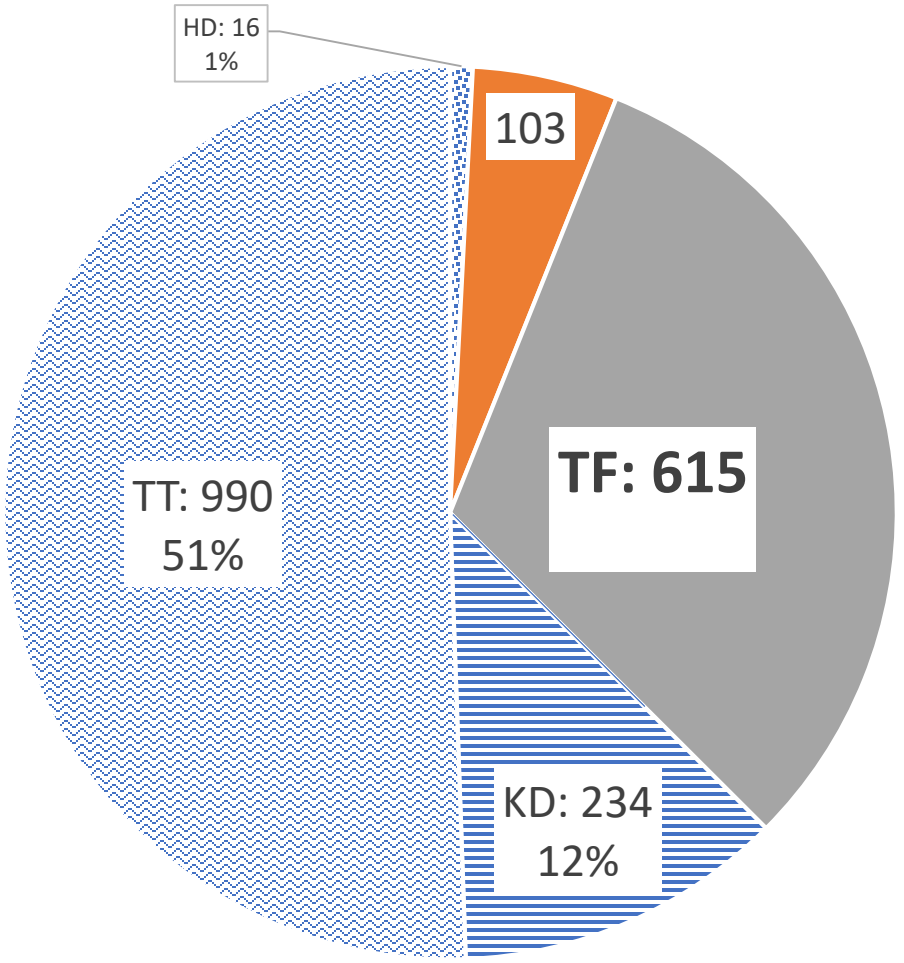
56% of the older than 80 yr

Only between 15-25% are provided with prosthesis on this level…

Probably around 100 new TF amputees receives prosthesis

≈ 1 out of every 7th TF amputation

Sweden 2016 all Lower Limb amputation above the foot level.



II. Who are they and how many (in Sweden)?

An estimation, published in 2009 (*):

- concluded that around 5000 to 5500 persons amputated above the trans-metatarsal level, are (hopefully) walking around in Sweden,
  - which is about 0.06% of the total population.
- According to these estimations the TF amputee population would then be 18,6% ≈ 976 TF amputees

* Thesis: Lower Limb Amputaiton in Patients with vascular disease. Johannesson, A. 2009 Lund University,

In Sweden there are currently around 50 O&P clinics

- This means that every year we have on average 2-3 new TF amputees per workshop
- 20 more amputees that need a socket changes or new prosthesis*

*my own estimation

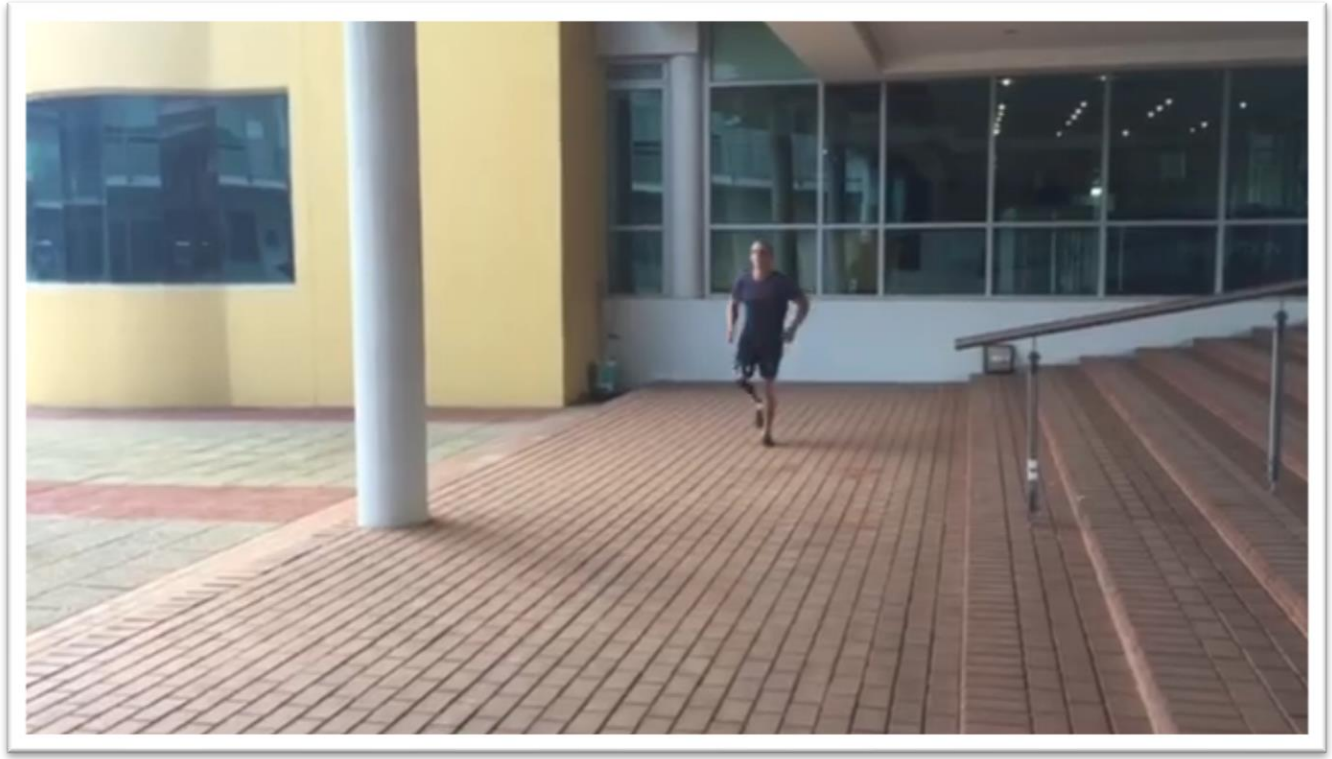
What does these statistics tell us?

Most of the TF amputees in Sweden are:

- old and dysvascular
  - with high level of comorbidities
- less than 20% receive prosthesis,

and

- on average every workshop does less than 20 TF sockets per year



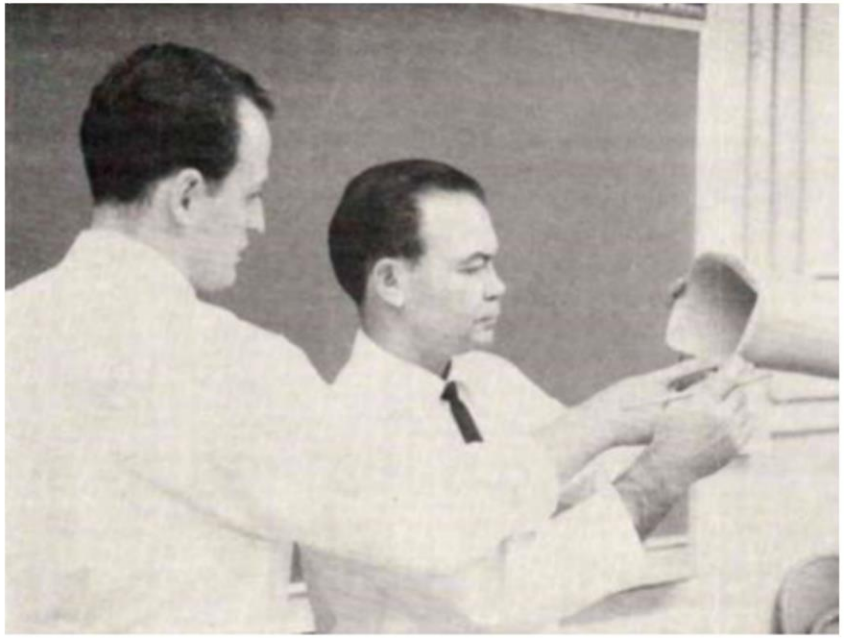
- The questions that arise:

- Does the current method of **<u>teaching</u>** how to make a TF prosthesis fulfil the requirements?

  - We make one (1) TF socket during our education…

  - US CPO´s are coming every 5th year with a new teaching method on how to take a cast and how to rectify it

Ivan Long
John Sabolich
Chris Hoyt
David Littig
Tim Statts
Marlo Ortis
Randy Allen



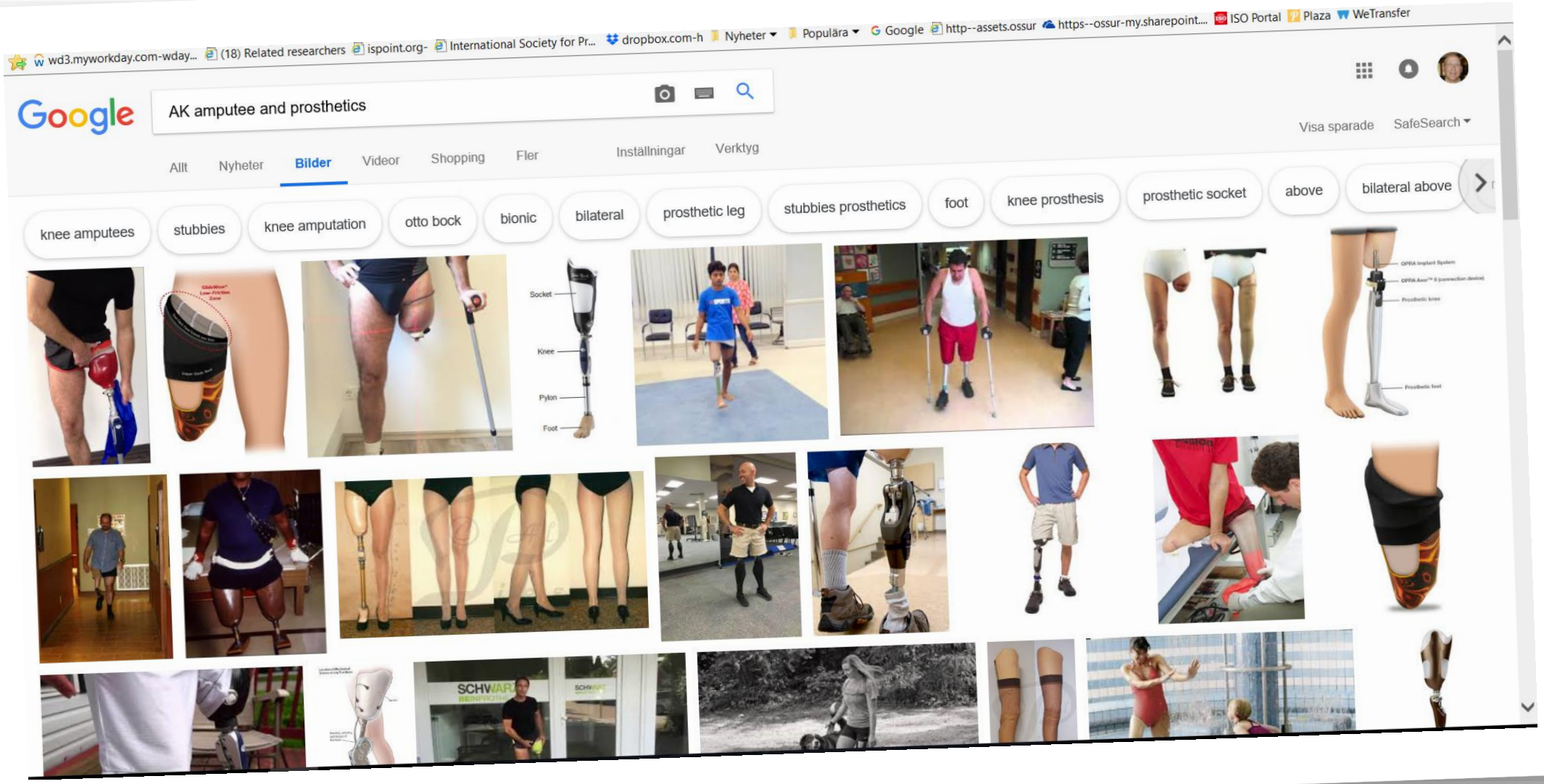
igure 1-On-the-job instruction: the teacher demonstrates and explains the operation to the student,

The question…..?:

- Is the current **service** model for the TF amputees good enough?
    - The functional outcome for elderly TF amputees is very poor with traditional technique

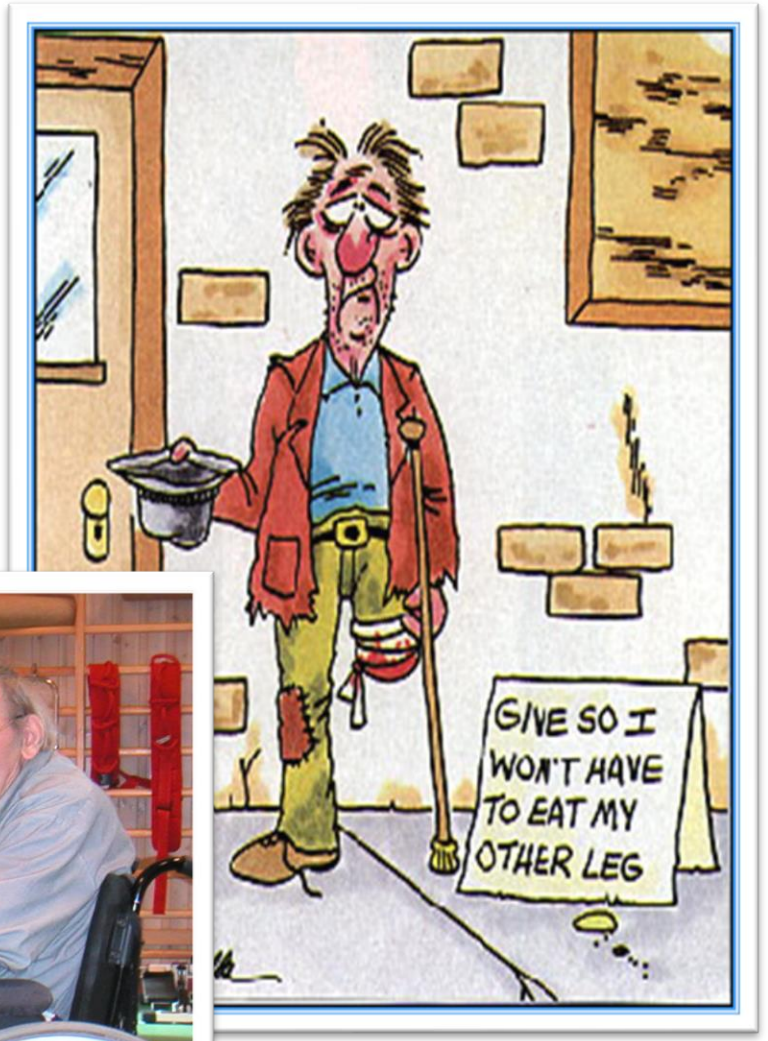
The question…..?:

- Is the current working method of **producing** a TF prosthesis efficient enough?
  - It require multiple visit to the clinic..
  - Test socket and another test socket…
  - Is that the best choice that we can offer the elderly patients?
    - The other foot is not always in good condition…


wd3.myworkday.com-wday...
(18) Related researchers
ispoint.org-
International Society for Pr...
dropbox.com-h
Nyheter
Populära
Google
http--assets.ossur
https--ossur-my.sharepoint....
ISO Portal
Plaza
WeTransfer
Google
AK amputee and prosthetics
Visa sparade
SafeSearch
Allt
Nyheter
Bilder
Videor
Shopping
Fler
Inställningar
Verktyg
knee amputees
stubbies
knee amputation
otto bock
bionic
bilateral
prosthetic leg
stubbies prosthetics
foot
knee prosthesis
prosthetic socket
above
bilateral above
Socket
Knee
Pylon
Foot

The question…..?:

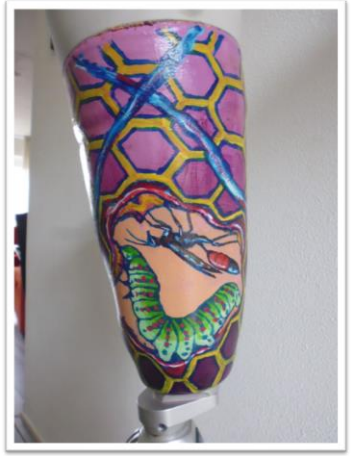
- Does the traditional **service** model, that we are offering TF amputees, fulfil the **requirement** of the society (= payer)?
  - *Does it benefit the amputee?*
  - *Does it reduce the burden of the society when providing them with prosthesis to make them more independent?*
  - *Isn´t it less costly to put them into a wheelchair?*

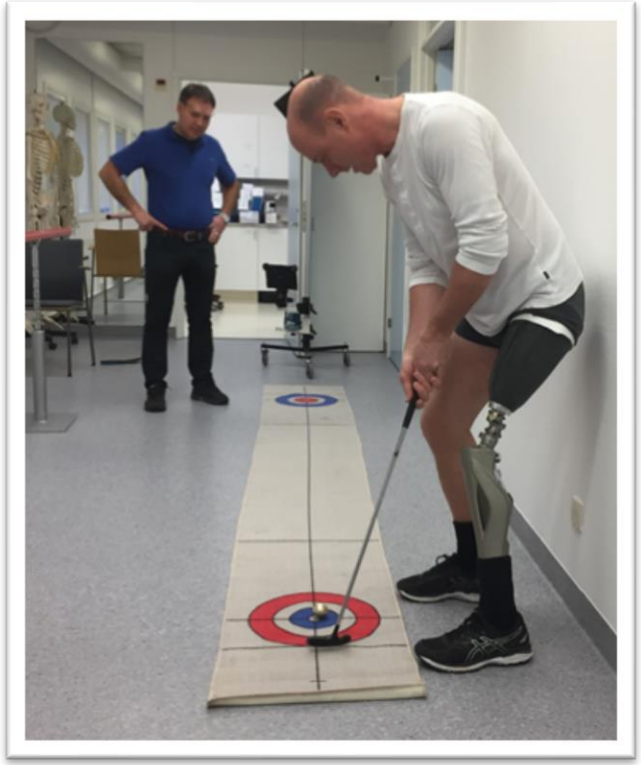


The question…..?:

- There are very few young active TF prosthetic users in the Nordic countries!

- Should it be more of a specialty?





III. From artistic approach to standardised process…

- Current research on new lower limb TT amputees, shows that we need to **improving all aspect of the process** * to improve the outcome

*Outcomes of a standardized surgical and rehabilitation program in trans-tibial amputation for peripheral vascular disease: a 10-year prospective cohort study. Johannesson, A., Larsson, G. U., Ramstrand, N., Henrik Lauge-Pedersen, H-L., Philippe Wagner, P. and Atroshi, I. American Journal of Physical Medicine & Rehabilitation, 2010; 89 (4): 293 – 303

Standardised treatment




If this process (in cooperation with other professions) is able to:

- lower the incidence of amputation
- lower the rate of proximal amputation
- shortening the hospital stay
- provide more of them with prosthesis
- so that the amputees can continue to life independently
- and to document the outcome

…..then we are hopefully……

Standardised treatment

<u>Then we deliver something that is in line with what the society and the users like to obtain from our services!</u>

This is the most inexpensive solution for the society, as most of the cost of amputation is related to hospital stays*

*Operations, total hospital stay and costs of critical leg ischemia. A population-based longitudinal outcome study of 321 patients. Eneroth M. et al. Acta Orthop Scand. 1996 Oct;67(5):459-65

*Cost of prostheses in patients with unilateral trans-tibial amputation for vascular diseases: a population-based follow-up during 8 years of 112 patients. Hermodsson Y. et. al. Acta Orthop Scand 69, 603-607

Standardised treatment

In TT amputation we obtain 41 days from amputation to prosthetic fitting with overall prosthetic rate of 55% during a 10 years period*

- Växjö and Varberg: has obtained the same result
- Capio St Görans: from 110 days to 37 days
- Huddinge: 41 days
- Södersjukhuset: 48 days and 50% receiving prosthesis….

*Outcomes of a standardized surgical and rehabilitation program in trans-tibial amputation for peripheral vascular disease: a 10-year prospective cohort study. Johannesson, A., Larsson, G. U., Ramstrand, N., Henrik Lauge-Pedersen, H-L., Philippe Wagner, P. and Atroshi, I. American Journal of Physical Medicine & Rehabilitation, 2010; 89 (4): 293 – 303

Not a standardised treatment….

*Thesis by Ulla Riis Madsen: **Quality of life, functional level and needs of care after vascular major lower limb amputation**. Lund University 2017

*Out of 103 consecutively amputated persons that were included:

- 28 patients (27%) had received prosthesis at a 12-months follow-up
- with a mean time of **161 days** (range 34-313 days)
- Conclusion: Waiting for an unnecessarily long period of time for a prosthesis can negatively impact both physical and psychosocial aspects of health-related QOL, and interventions to reduce waiting time are warranted

….

Maybe we should put more focus on these problem instead of a small part of it like: should we rectify the proximal part of the cast 3% or 4% or producing another test socket….?

Prosthetic components: Definitions

- ISO: 13405-2: **Prosthetics and orthotics — Classification and description of prosthetic components — Part 2: Description of lower-limb prosthetic components**
- ***3 Classification***
- ***3.1 General***
- *Prostheses are externally applied devices used to replace wholly, or in part, an absent or deficient limb segment. They are integrated constructions comprising the following classes of components*
- *a) interface components,*
- *b) functional components,*
- *c) alignment components,*
- *d) structural components,*
- *e) finishing (cosmetic) components.*

Prosthetic components: Definitions

- ISO: 13405-2: **Prosthetics and orthotics — Classification and description of prosthetic components — Part 2: Description of lower-limb prosthetic components**
- ***3 Classification***
- ***3.1 General***
- *Prostheses are externally applied devices used to replace wholly, or in part, an absent or deficient limb segment. They are integrated constructions comprising the following classes of components*
- ***a) interface components,***
- *b) functional components,*
- *c) alignment components,*
- *d) structural components,*
- *e) finishing (cosmetic) components.*

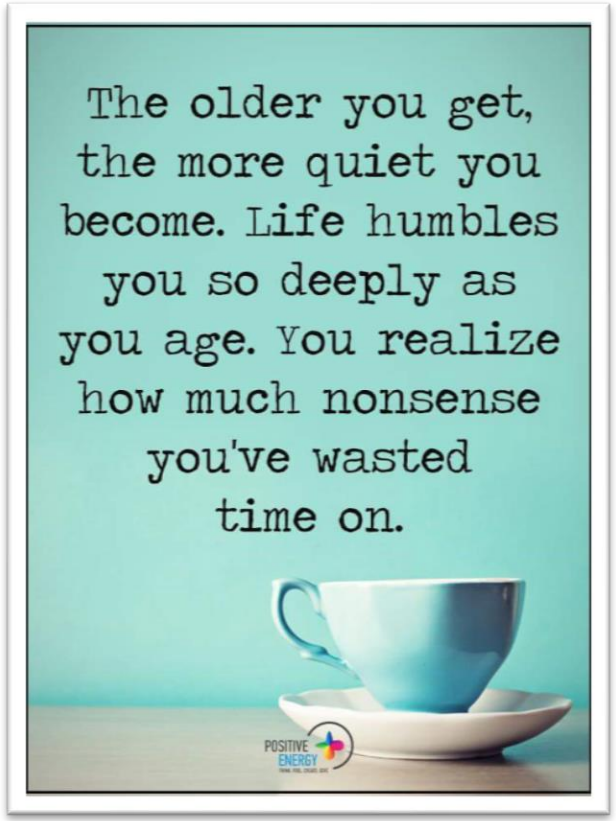
Various terms (e.g. total contact, total surface bearing, sub-ischial or inter ramus containment…) have been proposed to describe the way these forces are transferred between the stump and the socket. The biomechanical principles, upon which these terms are based, are ill-defined. Thus, the use of these terms is discouraged.

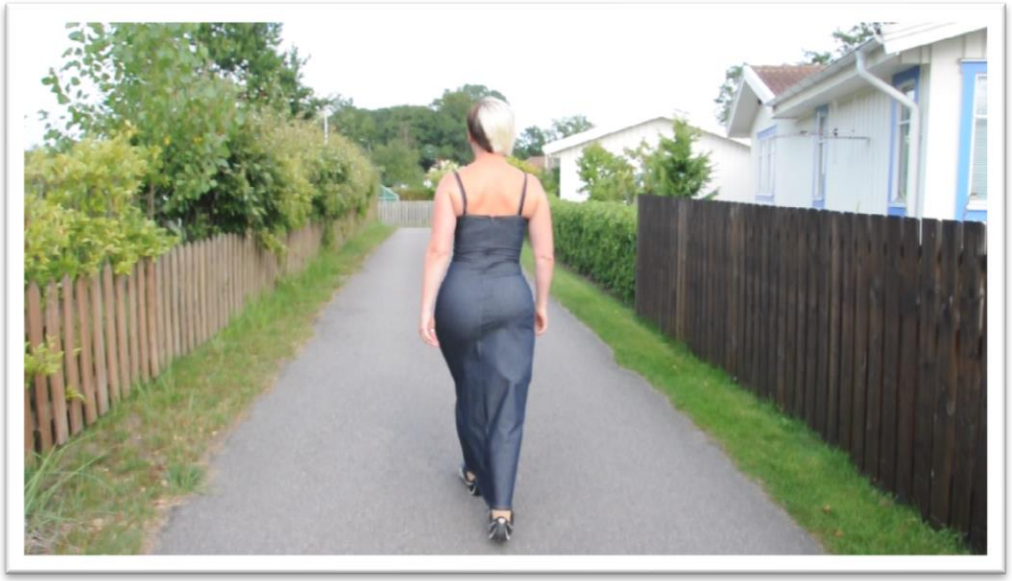
Prosthetic Interface

A **Trans-femoral Prosthetic Interface** has different function during gait cycle. The Force-transmission properties, i.e.

- Axial stabilization,
- Transverse stabilization and,
- Suspension, need to be described.

Thus, the stiffness property of the socket.





Thank you for your interest!