SALUD
SECRETARÍA DE SALUD

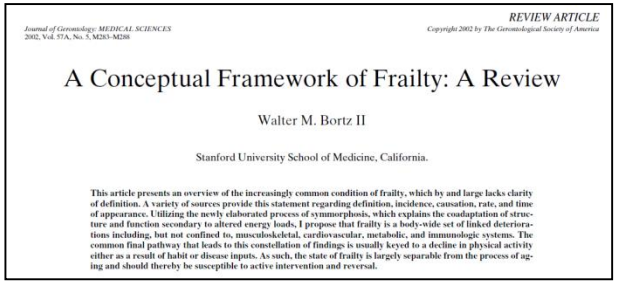
INSTITUTO NACIONAL DE GERIATRIA

ORAL HEALTH AND FRAILTY

Roberto Carlos Castrejón Pérez
Instituto Nacional de Geriatría
Aida Jiménez Corona
Instituto de Oftalmología "Conde de Valenciana", Dirección General de Epidemiología
Eduardo Bernabé
King's College London
Antonio R. Villa Romero
Facultad de Odontología, Universidad Nacional Autónoma de México
Elise Arrive
Inserm U 897 Université de Bordeaux II
Jean-Francois Dartigues
Inserm U 897 Université de Bordeaux II
Luis Miguel Gutiérrez Robledo
Instituto Nacional de Geriatría
S. Aída Borges Yáñez
Facultad de Odontología, Universidad Nacional Autónoma de México

Frailty

- ✓ Geriatric Syndrome
  - ➢ Diminished reserve capacity that increase the risk for adverse outcomes
  - ➢ "Excess demand imposed upon reduced capacity"
- ✓ Phenotype of Frailty
  - ➢ Weakness (lowest quintile of population/sample)
  - ➢ Slowness (lowest quintile of population/sample)
  - ➢ Low physical activity (lowest quintile of population/sample)
  - ➢ Low energy/poor endurance (self-report of fatigue)
  - ➢ Unintentional weight loss (≥5 Kg during the last year)



Journal of Gerontology: MEDICAL SCIENCES
2002, Vol. 57A, No. 5, M283–M288

REVIEW ARTICLE

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A Conceptual Framework of Frailty: A Review

Walter M. Bortz II

Stanford University School of Medicine, California.

This article presents an overview of the increasingly common condition of frailty, which by and large lacks clarity of definition. A variety of sources provide this statement regarding definition, incidence, causation, rate, and time of appearance. Utilizing the newly elaborated process of symmorphosis, which explains the coadaptation of structure and function secondary to altered energy loads, I propose that frailty is a body-wide set of linked deteriorations including, but not confined to, musculoskeletal, cardiovascular, metabolic, and immunologic systems. The common final pathway that leads to this constellation of findings is usually keyed to a decline in physical activity either as a result of habit or disease inputs. As such, the state of frailty is largely separable from the process of aging and should thereby be susceptible to active intervention and reversal.

Journal of Gerontology: MEDICAL SCIENCES
2004, Vol. 59, No. 3, 255–263

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Review Article

Untangling the Concepts of Disability, Frailty, and Comorbidity: Implications for Improved Targeting and Care

Linda P. Fried,[1,2,3] Luigi Ferrucci,[3] Jonathan Darer,[4] Jeff D. Williamson,[5] and Gerard Anderson[2]

The American Journal of Medicine (2007) 120, 748–753

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THE AMERICAN JOURNAL of MEDICINE®

REVIEW

Frailty: An Emerging Geriatric Syndrome

Nasiya Ahmed, MD,[a,b] Richard Mandel, MD,[a] Mindy J. Fain, MD[a,b]

[a]Southern Arizona VA Health Care System, Tucson and [b]University of Arizona, College of Medicine, Tucson

Fried L, et al. 2004. Bortz W. 2002. Ahmed N et al. 2007.
Morley J, et al. 2002. Rockwood K 2005. Powell C. 1997.

Oral Health

- ✓ Oral Health problems
  - ➢ Change in food selection
    - ◊ ↓Tocoferol, Carotenoids, Protein, Fiber, Vitamins
  - ➢ Malnutrition status
    - ◊ Anorexia of the elderly
    - ◊ Sarcopenia (sarcopenic-obesity)

Editorials

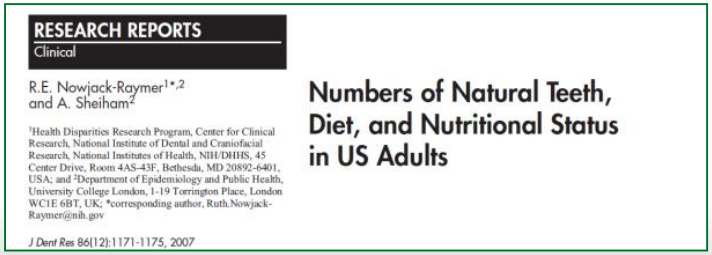
Oral health, general health and quality of life

Aubrey Sheiham[1]

The compartmentalization involved in viewing the mouth separately from the

Oral health affects people physically and psychologically and influ-

fined in general physical, psychological and social well-being terms in relation



RESEARCH REPORTS
Clinical

R.E. Nowjack-Raymer[1]*,[2] and A. Sheiham[2]

[1]Health Disparities Research Program, Center for Clinical Research, National Institute of Dental and Craniofacial Research, National Institutes of Health, NIH/DHHS, 45 Center Drive, Room 4AS-43F, Bethesda, MD 20892-6401, USA; and [2]Department of Epidemiology and Public Health, University College London, 1-19 Torrington Place, London WC1E 6BT, UK; *corresponding author, Ruth.Nowjack-Raymer@nih.gov

Numbers of Natural Teeth, Diet, and Nutritional Status in US Adults

J Dent Res 86(12):1171-1175, 2007

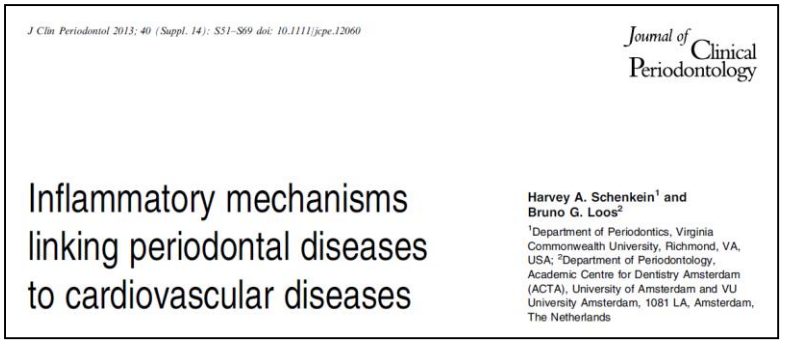
Avlund K et al. 2011
Semba RD et al. 2006
Sheiham A et al. 2001

Ahmed N et al. 2007
Koehler J et al. 2008
Hutton B et al. 2002

N'Gom P I et al. 2002
Nowjack-Raymer RE et al. 2003
Walls AW et al.2000

Oral Health

- ✓ Oral Health problems
  - ➢ Acute inflammation
  - ➢ Chronic inflammation
    - ◊ ↑IL-1β, IL-6, TNF-α, PGE_2, Leukotrienes, Histamine
    - ◊ Reach liver to release C-Reactive Protein, fibrinogen, and others
    - ◊ With multiple pro-inflammatory activities and stimulation for tissue repair mechanisms.
  - ➢ Effects on
    - ◊ Liver, kidney, cognitive impairment, cardiovascular system


J Clin Periodontol 2013; 40 (Suppl. 14): S51–S69 doi: 10.1111/jcpe.12060

Journal of Clinical Periodontology

Inflammatory mechanisms linking periodontal diseases to cardiovascular diseases

Harvey A. Schenkein[1] and Bruno G. Loos[2]

[1]Department of Periodontics, Virginia Commonwealth University, Richmond, VA, USA; [2]Department of Periodontology, Academic Centre for Dentistry Amsterdam (ACTA), University of Amsterdam and VU University Amsterdam, 1081 LA, Amsterdam, The Netherlands


Volume 76 • Number 11 (Suppl.)

Systemic Markers of Inflammation in Periodontitis

Bruno G. Loos*

Madianos PN et al. 2010
Lipsitz LA. Sci Aging Knowledge Environ. 2004
Walston J. Sci Aging Knowledge Environ. 2004

Fitzsimmons TR, et al. Aust Dent J. 2009
Karnoutsos K, et al. Hippokratia. 2008
Noble J, et al J Neurol Neurosurg Psychiatry. 2009

Oral Health during Life Course

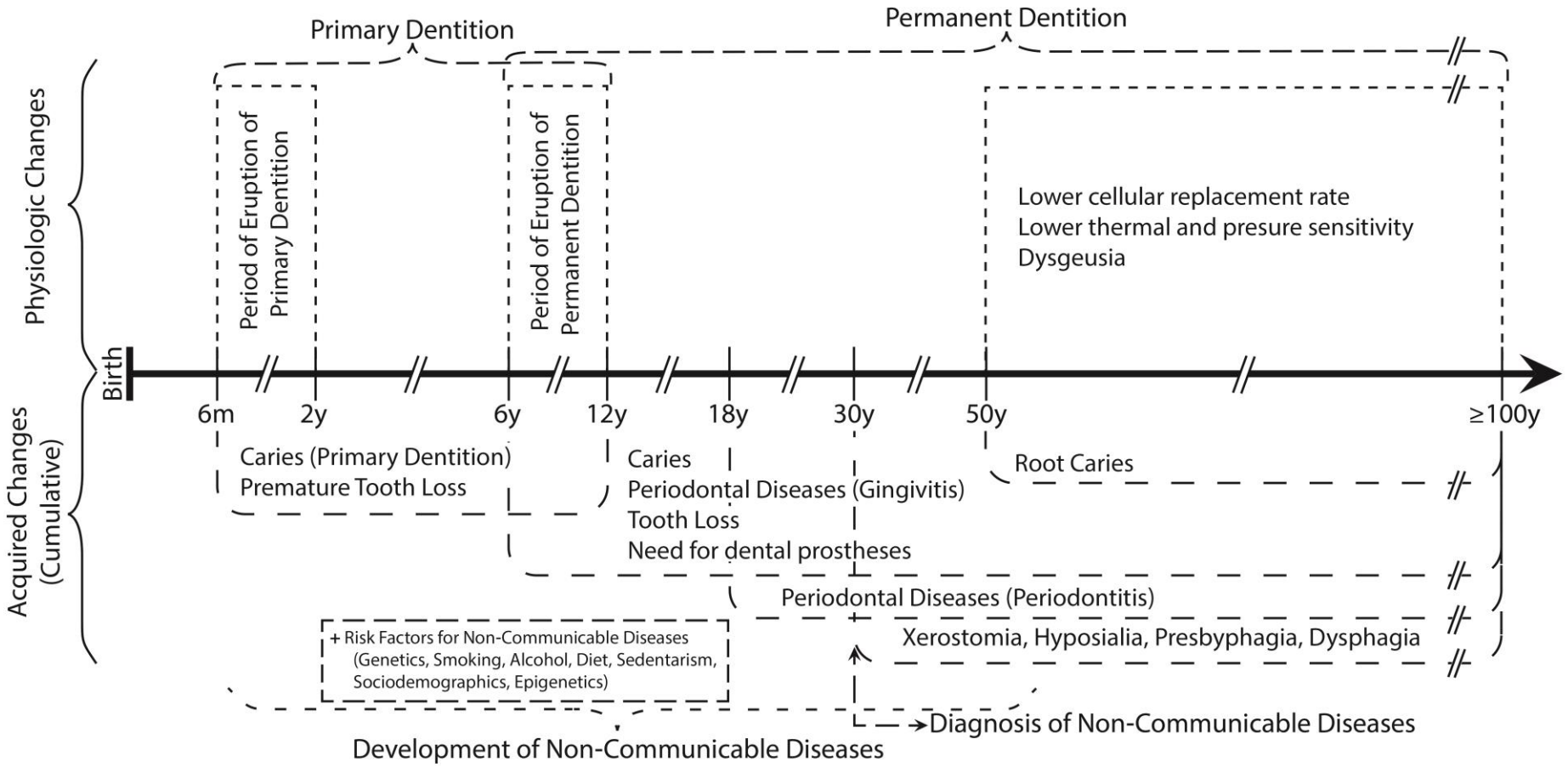
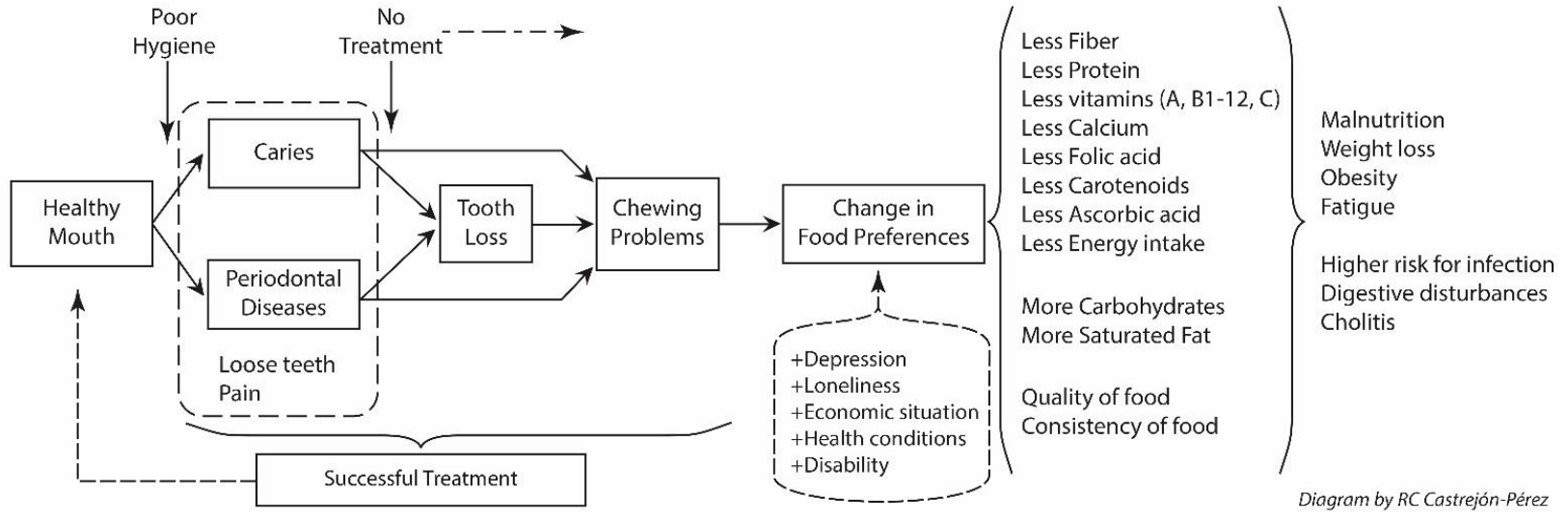


Diagram by RC Castrejón-Pérez

Oral Health and Nutrition

- ✓ Effects:
  - ➢ Food choices
    - ◊ Quality
    - ◊ Consistency
  - ➢ ↓ Fiber
  - ➢ ↓ Protein
  - ➢ ↓ Vit. A, B6, B1, C
  - ➢ ↓ Calcium & Iron
  - ➢ ↓ Folic acid
  - ➢ ↓ Weight loss (unintentional)
  - ➢ ↑ Carbohydrates and sucrose
  - ➢ ↑ Risk for obesity



J Nutr Health Aging 2004;8(5):333-339
Revista de Nutrición Clínica 2003;6:9-16
Gerodontology 2007;24 (2): 87
J Can Dent Assoc 1994 May;60(5):443-6
Eur J Clin Nutr 1996;50 Suppl 2:S117-22
J Can Dent Assoc 1994; 60(5):443-449

Oral Dis 1999; 5:32-8
Br Dent J 1994 Oct 8;177(7):243-7
Nut Clin 2003;6(1) :46.52
Journal of Frailty and Aging 2014; 3(3):180-186

Objective

To evaluate the association among oral health conditions and utilization of dental services with the incidence of frailty in elderly 70 years old and over in one district of Mexico City.

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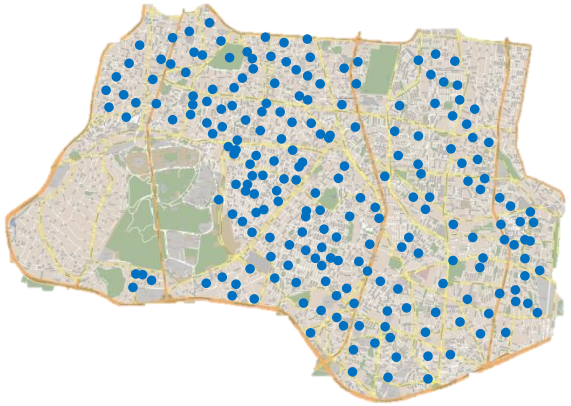
METHODS

Methods

- ✓ Type of study
  - ➢ Cohort 2008-2011
  - ➢ Two measurements
  - ➢ Household survey
- ✓ Study population
  - ➢ ≥70 years
  - ➢ Residents of Coyoacán, México
  - ➢ Registered at the Food Support, Medical Care, and Free Drugs Program (33000)



Methods

- ✓ Sample
  - ➢ Probabilistic representative sample (n=1294)
  - ➢ Stratified by sex and age
- ✓ Inclusion criteria
  - ➢ ≥70 years registered at the Food Support, Medical Care, and Free Drugs Program, residents of Coyoacán, México
  - ➢ Accepted the dental clinical evaluation
- ✓ Exclusion criteria
  - ➢ Did not accept to participate in the second stage or did not agree to the dental clinical evaluation

Variables

Independent variables

- ✓ Socio-demographic
  - ➢ Age, Sex, Education (years), Marital status
- ✓ Medical conditions (Yes/no)
  - ➢ Stroke, Hypertension, Diabetes, Osteoporosis, Arthritis, Urinary incontinence
- ✓ Oral health (Yes/no)
  - ➢ Utilization of dental services
  - ➢ Xerostomia
- ✓ Oral Health Impact Profile (14-Sp)

Dependent variable

Frailty

- ✓ Yes = Having ≥3 of five components
  - ➢ Weakness
  - ➢ Slowness
  - ➢ Low physical activity
  - ➢ Fatigue
  - ➢ Unintentional weight loss
- ✓ No ≤2 of the components

Oral Health Variables

- ✓ Clinical evaluation
  - ➢ Number of teeth (0/1-24/≥25)
  - ➢ Wearing Removable Partial Dentures [RPD] and/or Complete Dentures [CD] (Y/N)
  - ➢ Functionality of RPD and/or CD (Ettinger) (Y/N)
  - ➢ Severe periodontitis (Periodontal Screening and Recording modified) (≥2 teeth with ≥5 mm attachment loss)

Ettinger RL, et al. Community Dent Oral Epidemiol. 1997
American Dental Association. Periodontal Screening and Recording

Methods

- ✓ Oral Health Clinical evaluation
  - ➢ 4 standardized dental students (National Autonomous University of Mexico)
    - ◊ Functionality of RPD/CD (K=0.9)
    - ◊ Periodontitis (K=0.7)
- ✓ Protocol for infection control
- ✓ Ethics
  - ➢ Informed consent

Statistical Analysis

- ✓ Prevalence of frailty during 2008-2009
- ✓ Incidence of frailty in 2011
- ✓ Univariate analysis… …by incidence of frailty
  - ➢ …Socio-demographic…
  - ➢ …Medical conditions…
  - ➢ …Oral health conditions…
- ✓ Poisson regression model (dependent variable: incidence of frailty)

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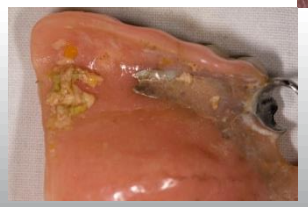
RESULTS

Characteristics of the participants (n=699)

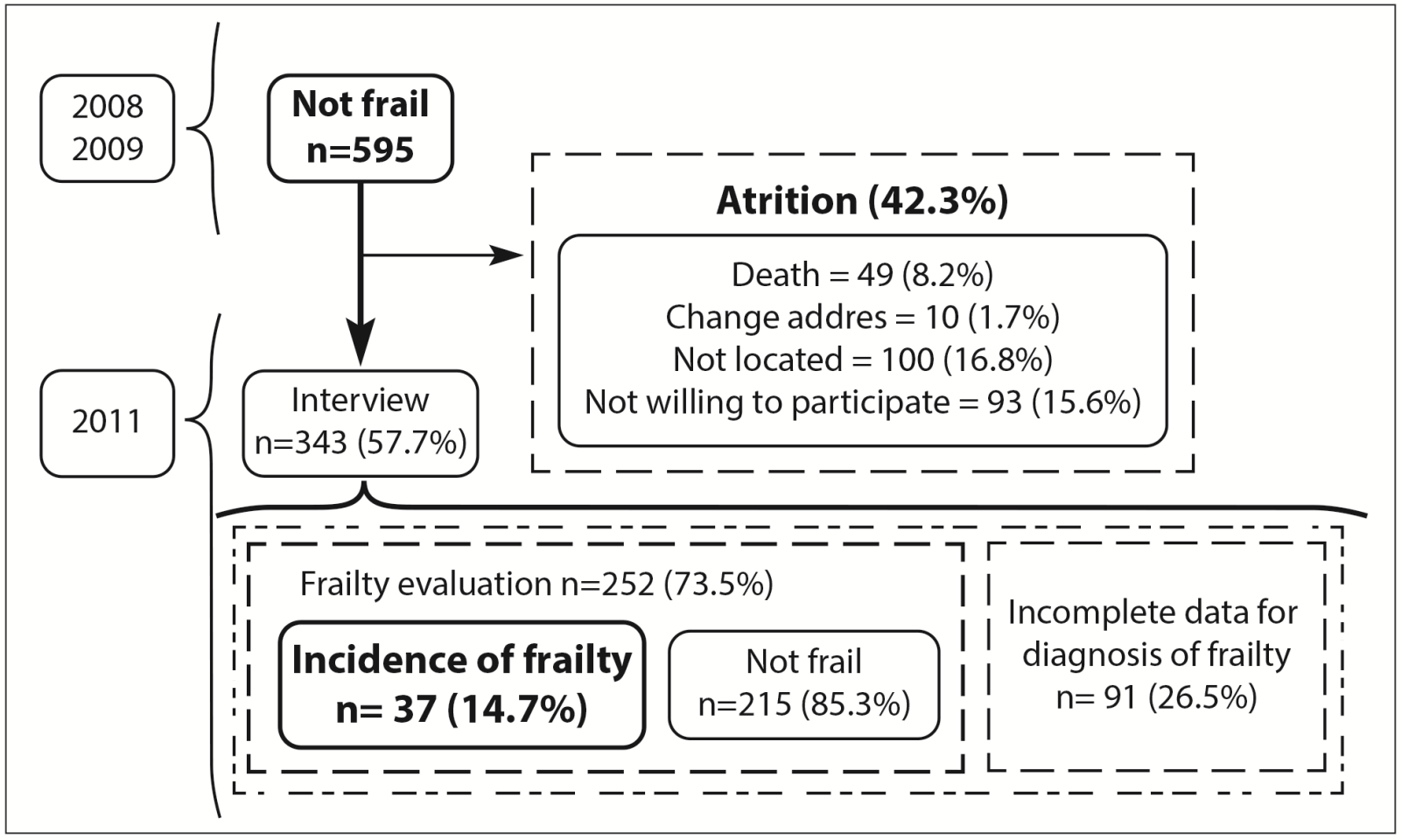
- ✓ Age
  - ➢ 77.9 ± 6.3 years old
- ✓ Women 53.2% (n=372)
- ✓ Married
  - ➢ Men (57.3%)
- ✓ Widowed
  - ➢ Women (46.3%)
- ✓ Education (years of schooling) (7.3 ± 5.4) ($p<0.05$)
  - ➢ Men (7.9 ± 5.8)
  - ➢ Women (6.7 ± 5.0)







Flow of participants and Incidence of Frailty



Characteristics of the participants (n=252)

- ✓ **Age 77 ± 5.3 years old**
- ✓ **Women 51%**
- ✓ **Iliteracy 10.8%**
- ✓ Self-rated general health (regular-bad) 41.7%
- ✓ **Edentate 21.8%**
- ✓ Xerostomia 43.7%
- ✓ **Severe periodontitis 17%**
- ✓ Stroke 2.4%
- ✓ **Hypertension 56%**
- ✓ Hypercholesterolemia 35.7%
- ✓ Hypertrigliceridemia 20.6%
- ✓ Osteoporosis 14.7%
- ✓ Arthritis 18.7%
- ✓ **Diabetes 18%**

Incidence of Frailty by Socio-Demographic

- ✓ Those who developed frailty were
  - Older (80.4 ± 6.4 years Vs. 75.8 ± 4.8 years) [$p<0.001$]
  - Have less years of education (5.4 ± 4.3 Vs. 7.3 ± 5.0) [$p<0.05$]
- ✓ No differences (14.7%) were found by…
  - …Sex
  - …Marital status
  - …Utilization of dental services
  - …Xerostomia

Incidence of Frailty by Medical Conditions

Baseline factors	Non Frail/Frail (%)	RR [95% CI]	p value[a]
Age in years [Mean (SD)]	**75.71 (4.7)/80.34 (6.4)***	**1.11 [1.07-1.15]**	**0.000**
Education in years [Mean (SD)]	**7.26 (4.9)/5.35 (4.3)***	**0.93 [0.87-0.99]**	**0.048**
Gender [Men/Women]	13.0/16.4	1.26 [0.68-2.34)	0.470
Marital status [Married/Nor Married]	11.5/18.3	1.59 [0.85-2.98]	0.147
Number of medications [Mean (SD)]	**2.38 (1.8)/3.74 (4.0)***	**1.35 [1.19-1.54]**	**0.000**
MMSE score [Mean (SD)]	**23.23 (3.5)/21.14 (3.5)***	**0.86 [0.79-0.95]**	**0.002**
Stroke [No/Yes]	14.8/16.7	1.13 [0.18-6.96]	0.897
Hypertension [No/Yes]	**9.0/19.0**	**2.11 [1.03-4.31]**	**0.041**
Diabetes [No/Yes]	**11.9/27.3**	**2.29 [1.23-4-24]**	**0.009**
Osteoporosis [No/Yes]	**11.9/30.6**	**2.56 [1.38-4.76]**	**0.003**
Arthritis [No/Yes]	13.5/20.5	1.51 [0.76-3.00]	0.238
Smoking Never/Former	16.5/13.9	0.84 [0.44-1.60]	0.598
Never/Current	16.5/11.5	0.70 [0.22-2.21]	0.542
Drinker [No/Yes]	17.8/9.4	0.53 [0.25-1.11)	0.095

Incidence of Frailty by Oral Health

Baseline factors	Non Frail/Frail (%)	RR [95% CI]	p value[a]
OHIP-14 [Median (IQR)]	**6 (0-26)/3 (0.35)**	**1.03 [1.00-1.06]**	**0.032**
Utilization of dental services [No/Yes]	15.1/14.4	1.05 [0.56-1.94]	0.886
Xerostomia [No/Yes]	13.6/16.2	1.19 [0.64-2.19]	0.583
Number of teeth [Mean (SD)]	**12.55 (9.6)/9.57 (9.5)***	**0.97 [0.94-1.00]**	0.100
Severe periodontitis [No/Yes]**	**10.8/18.4**	**1.70 [0.79-3.65]**	0.171
Utilization of RDP [No/Yes]	10.9/17.6	1.13 [0.18-6.96]	0.897
Not functional RDP [No/Yes]	19.1/14.9	1.28 [0.57-2.88]	0.547
Tooth remnants [No/Yes]	18.3/10.8	0.59 [0.31-1.13]	0.115
** Estimated among 188 dentate participants			

Poisson Regression Model (Number of teeth n=252)

Oral health measures	Model 1	Model 2	Model 3
	RR [95% CI]	RR [95% CI]	RR [95% CI]
Age (Years)	**1.10 [1.06-1.14]***	**1.09 [1.05-1.14]***	**1.08 [1.04-1.13]***
Gender (Male/Female)	1.06 [0.59-1.92]	0.73 [0.42-1.29]	0.77 [0.42-1.42]
Education (Years)	**0.93 [0.87-0.99]***	**0.94 [0.88-0.99]***	**0.94 [0.88-1.00]***
Hypertension (No/Yes)		1.83 [0.98-3.44]	1.58 [0.83-3.01]
Diabetes (No/Yes)		1.62 [0.85-3.07]	0.70 [0.29-1.67]
Osteoporosis (No/Yes)		**2.30 [1.19-4.44]***	**2.39 [1.27-4.46]***
MMSE (score)		0.94 [0.85-1.04]	0.94 [0.86-1.03]
Number of medications		**1.23 [1.08-1.40]***	**1.26 [1.11-1.44]***
Number of teeth [0-32]	0.98 [0.95-1.01]	0.98 [0.95-1.01]	**0.95 [0.91-0.98]***
Interaction term (number of teeth by diabetes)			**1.08 [1.02-1.15]***

*p<0.05

Poisson Regression Model (Periodontitis n=188)

Oral health measures	Model 1	Model 2	Model 3
	RR [95% CI]	RR [95% CI]	RR [95% CI]
Age (Years)	**1.09 [1.05-4.36]***	**1.09 [1.03-1.16]***	**1.09 [1.02-1.16]***
Gender (Male/Female)	1.33 [0.68-2.61]	0.92 [0.48-1.77]	0.93 [0.46-1.87]
Education (Years)	**0.89 [0.82-0.92]***	0.93 [0.85-1.02]	0.91 [0.83-1.00]
Hypertension (No/Yes)		**2.94 [1.26-6.84]***	**2.56 [1.09-6.04]***
Diabetes (No/Yes)		1.95 [0.94-4.04]	0.62 [0.11-3.49]
Osteoporosis (No/Yes)		1.88 [0.83-4-25]	1.81 [0.79-4.10]
MMSE (score)		0.92 [0.81-1.05]	0.94 [0.83-1.06]
Number of medications		**1.23 [1.06-1.44]***	**1.26 [1.07-1.49]***
Severe periodontitis (No/Yes)	**2.14 [1.05-4.36]***	**2.52 [1.25-5.07]***	**2.13 [1.01-4.50]***
Number of teeth [0-32]			**0.94 [0.90-0.99]***
Interaction term (number of teeth by diabetes)			1.08 [0.99-1.18]

*p<0.05

Conclusion

- ✓ Diabetes, severe periodontitis, age and number of medication increases the risk for developing frailty.
- ✓ The number of teeth reduces the risk for development of frailty
- ✓ Clinicians should consider diabetes and number of teeth as conditions associated to the incidence of frailty.

Funding

Funded by Consejo Nacional de Ciencia y Tecnología de México
(SALUD-2006-C01- 45075)
And Universidad Nacional Autónoma de México
UNAM

roberto.castrejon@salud.gob.mx
rc.castrejon.perez@gmail.com

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roberto.castrejon@salud.gob.mx
rc.castrejon.perez@gmail.com

¡GRACIAS POR SU ATENCIÓN!