FECAL INCONTINENCE
EPIDEMIOLOGY, CLASSIFICATION AND SEQUELS

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Definition

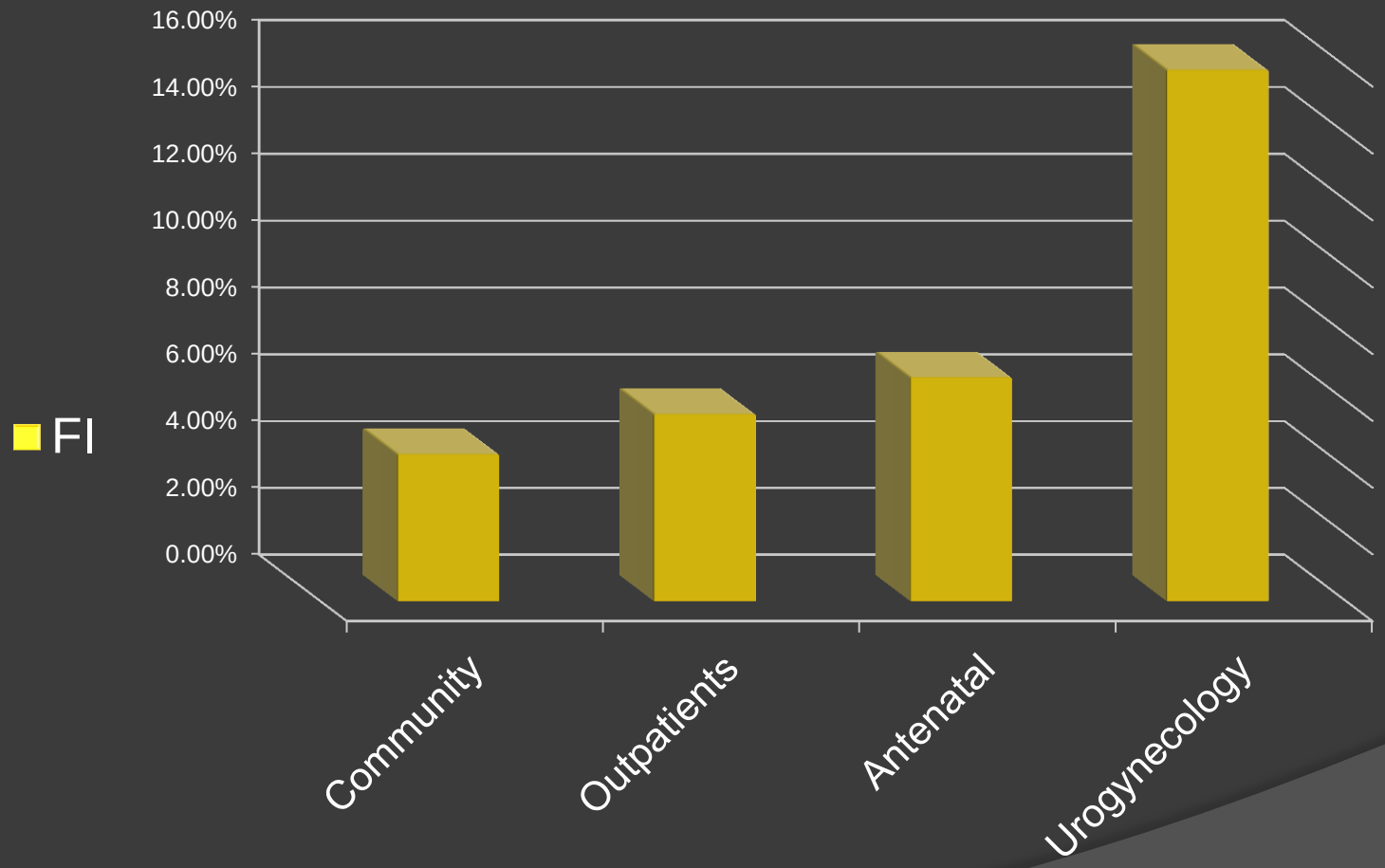
- Devastating nonfatal illness, resulting in embarrassment and anxiety.
- Involuntary loss of rectal contents through the anal canal: solid or liquid feces or mucus.
- Does not relate to gas incontinence.
- Effects may include embarrassment, social isolation, and even loss of employment.
- It is believed to be a frequent cause of referral to a nursing home.

Epidemiology

- 8.3% of noninstitutionalized adults in the United States report FI at least once during the last 30 days.
- This estimate corresponds to **18 million.**
- The prevalence is similar in women and men.

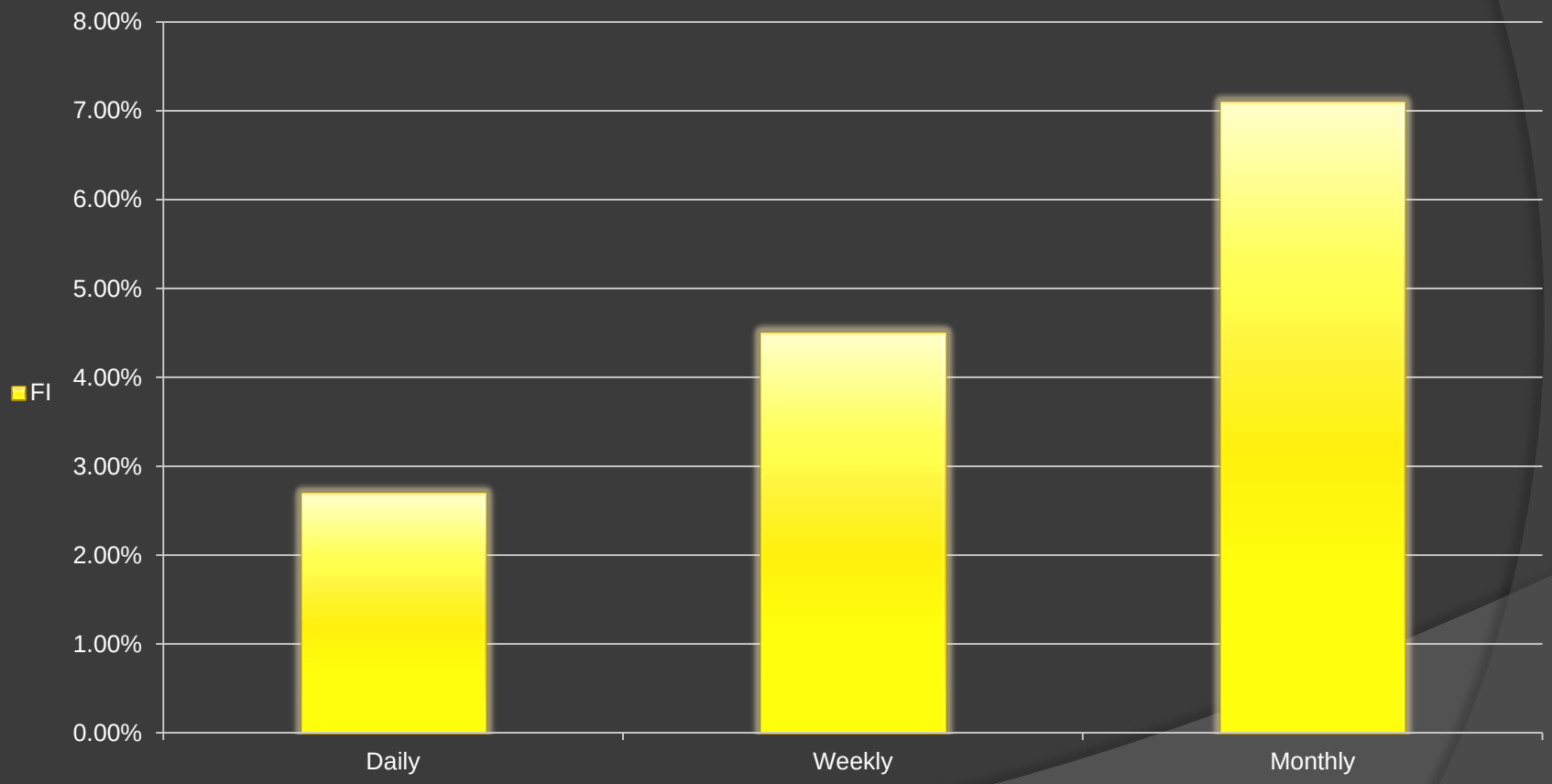
- **Whitehead WE, Gastroenterology 2009.**

Epidemiology



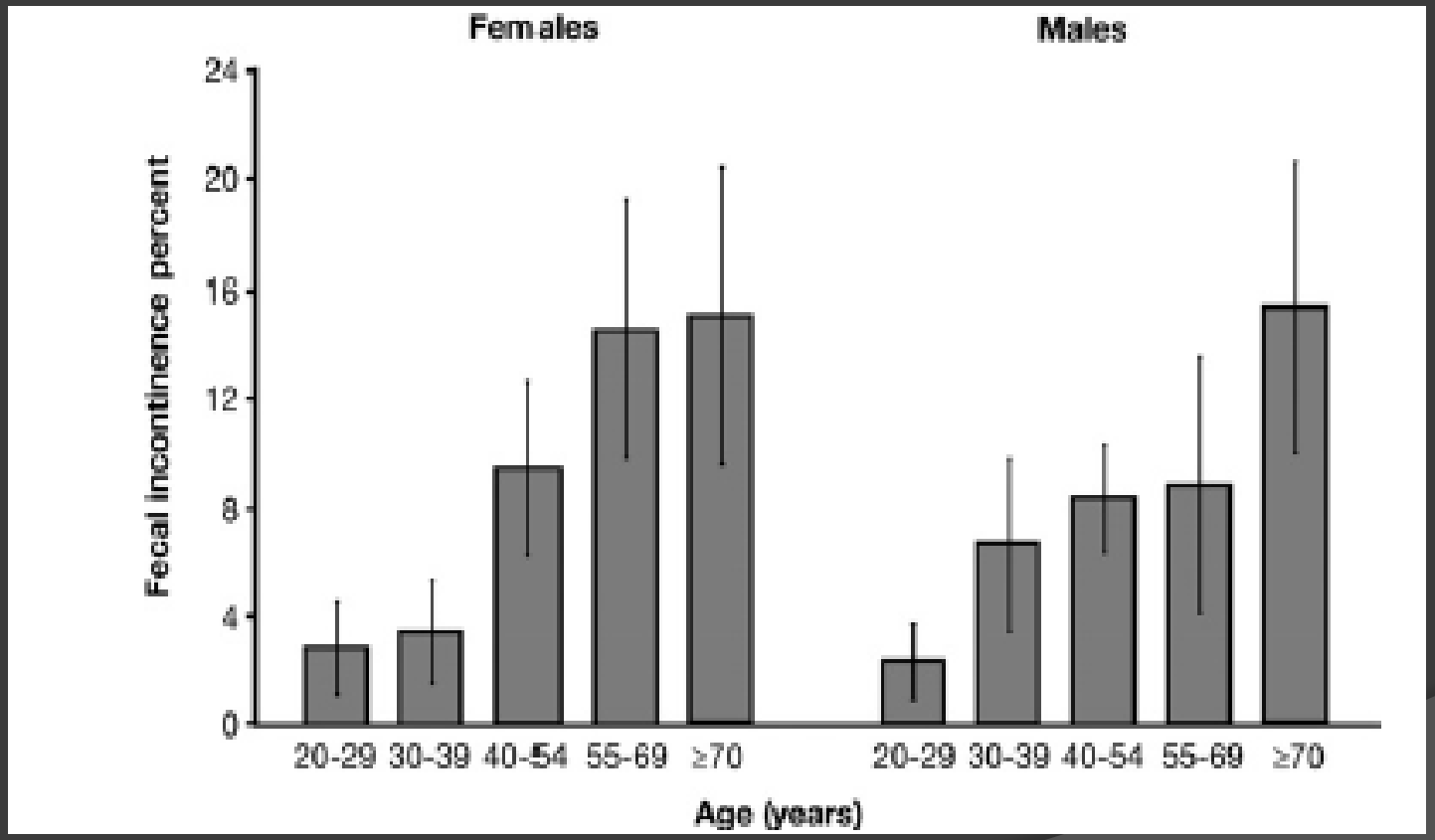
Faltin Dl, Int Urogynecol J Pelvic Dysfunct 2001

Frequency of Incontinence



Johnson JF, Am J Gastroenterol 1996

Age

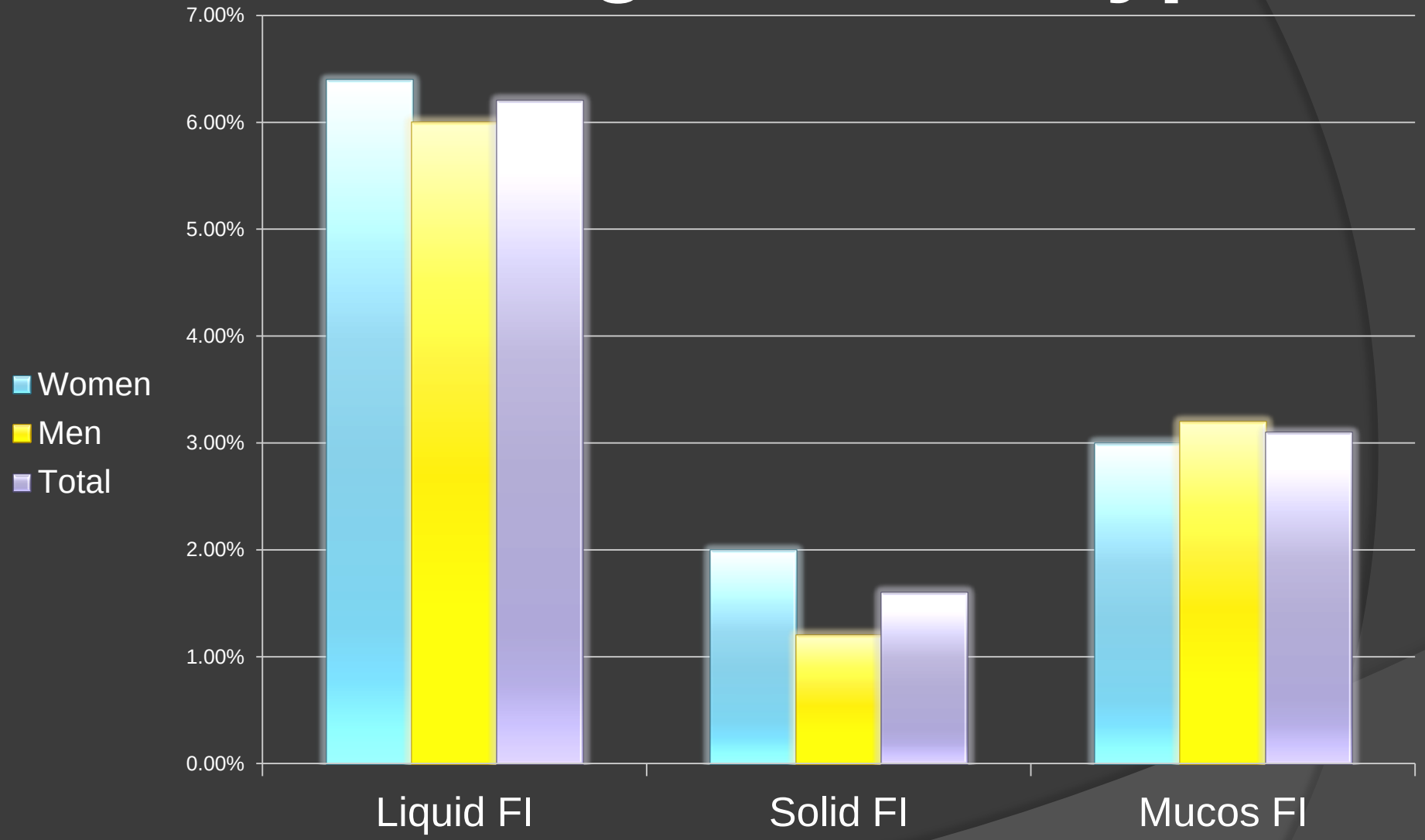

Females
Males
Fecal incontinence percent
24
20
16
12
8
4
0
20-29
30-39
40-54
55-69
≥70
20-29
30-39
40-54
55-69
≥70
Age (years)

General Condition

- FI affects individuals with severe physical and mental disabilities.
- 46% in long term hospital inpatients in Canada.
- 47% of patients in USA nursing homes.
- There is association between severe fecal incontinence and increasing mortality

- MJ Borrie *CMAJ*, 1992. Nelson, *Dis Colon Rectum*1998, N Nakanishi Age Ageing 1999

FI According to Stool Type

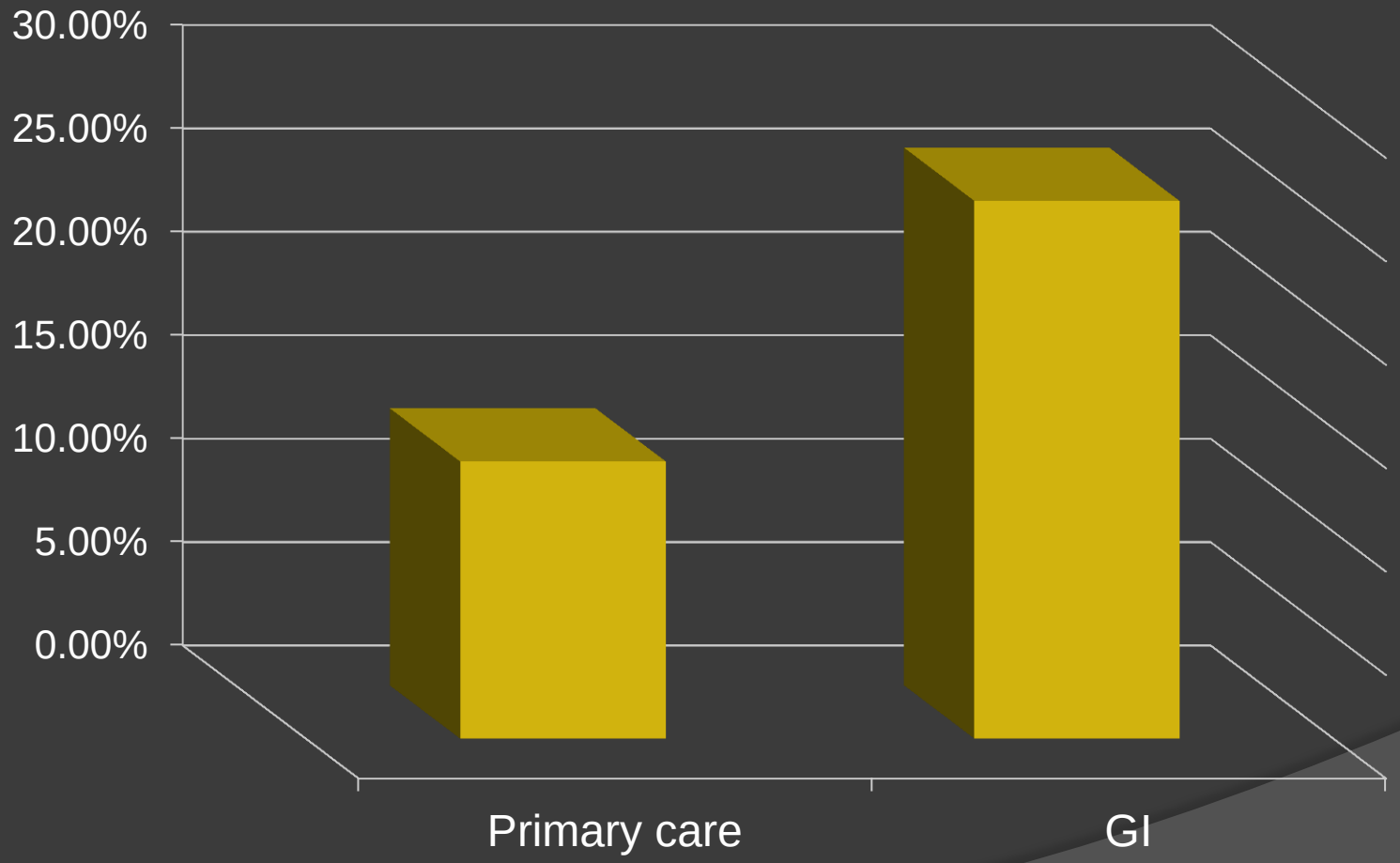


Whitehead WE Gastroenterologhy 2009

Risk Factors

	Women				Men			
	Bivariate analysis		Multivariate analysis		Bivariate analysis		Multivariate analysis	
Risk factor	Odds ratio (95% CI)	*P*	Odds ratio (95% CI)	*P*	Odds ratio (95% CI)	*P*	Odds ratio (95% CI)	*P*
Age (10-year interval)	1.41 (1.31–1.51)	<.0001	1.20 (1.10–1.31)	<.0001	1.32 (1.22–1.44)	<.0001	1.24 (1.09–1.41)	.0009
Usual stool consistency (vs normal stools)								
Loose, watery stools	3.36 (2.21–5.10)	<.0001	2.82 (1.95–4.08)	<.0001	5.78 (2.76–12.08)	<.0001	4.76 (1.94–11.69)	.0007
Hard, lumpy stools	1.06 (0.60–1.90)	.84	1.00 (0.54–1.86)	1.00	2.60 (1.10–6.12)	.029	1.76 (0.64–4.82)	.27
Usual stool frequency (vs 3–21 bowel movements per week)								
>21 bowel movements per week	5.38 (2.55–11.30)	<.0001	2.36 (1.09–5.12)	.029	5.51 (2.68–11.3)	<.0001	2.26 (0.86–5.9)	.097
<3 bowel movements per week	1.96 (0.83–4.60)	.12	1.62 (0.65–4.03)	.30	1.71 (0.87–3.37)	.12	1.04 (0.43–2.54)	.93
BMI (vs normal/underweight; BMI <25 kg/m²)								
Overweight (BMI 25–29.9 kg/m²)	1.24 (0.82–1.86)	.31	1.09 (0.65–1.81)	.75	0.96 (0.59–1.56)	.87	0.90 (0.53–1.54)	.70
Obese (BMI ≥30 kg/m²)	1.71 (1.15–2.54)	.0078	1.19 (0.76–1.87)	.44	1.35 (0.97–1.89)	.079	1.21 (0.86–1.70)	.28
Vigorous activity (vs no vigorous activity)								
Does vigorous activity	0.48 (0.24–0.97)	.041	0.59 (0.27–1.25)	.17	0.64 (0.40–1.04)	.071	0.78 (0.43–1.42)	.41
Unable to do any activity	2.61 (1.36–4.97)	.0037	2.23 (1.09–4.57)	.028	1.00 (0.44–2.26)	1.00	0.77 (0.31–1.92)	.57
Chronic ills (vs no chronic ills)								
1 chronic ills	2.37 (1.55–3.63)	<.0001	1.96 (1.34–2.87)	.0006	1.25 (0.73–2.14)	.41	1.07 (0.65–1.77)	.78
≥2 chronic ills	3.12 (1.73–5.63)	.0002	2.20 (1.19–4.05)	.012	1.38 (0.77–2.47)	.27	1.02 (0.55–1.90)	.95
Poor self-rated health	1.91 (1.14–3.21)	.015	1.20 (0.63–2.31)	.58	2.20 (1.62–2.98)	<.0001	1.78 (1.18–2.66)	.0056
Urinary incontinence	2.08 (1.41–3.07)	.0002	1.62 (0.99–2.66)	.054	3.39 (2.12–5.40)	<.0001	2.60 (1.44–4.67)	.0014

Prevalence According to Medical Specialty



Epidemiology

- Under-reporting of symptoms by patients is a major reason for undertreatment.
- Only a third of symptomatic patients in the USA discuss their fecal incontinence with their physicians.
- In the United Arab Emirates, 60% of multiparous women with fecal incontinence do not seek medical advice because of embarrassment, the hope that the problem will resolve spontaneously, the assumption that fecal incontinence is normal, or low expectations of medical care.

Johnson JF Am J Gastroenterol 1998, Risk DE, Dis Colon Rectum 2001

Costs

- The cost includes the evaluation, diagnostic testing and treatment of incontinence, the use of disposable pads and other ancillary devices, skin care, and nursing care.
- Approximately $400 million/year is spent on adult diapersand between $1.5 and $7 billion/year is spent on care for incontinence among institutionalized older patients.

Anorectal Continence Mechanisms

Reservoir Elements

- Rectal accommodation
- Colonic accommodation

Sensory & Motor Elements

- Puborectalis / Levator Ani
- Rectal sensation
- Internal anal sphincter
- External anal sphincter

Etiology

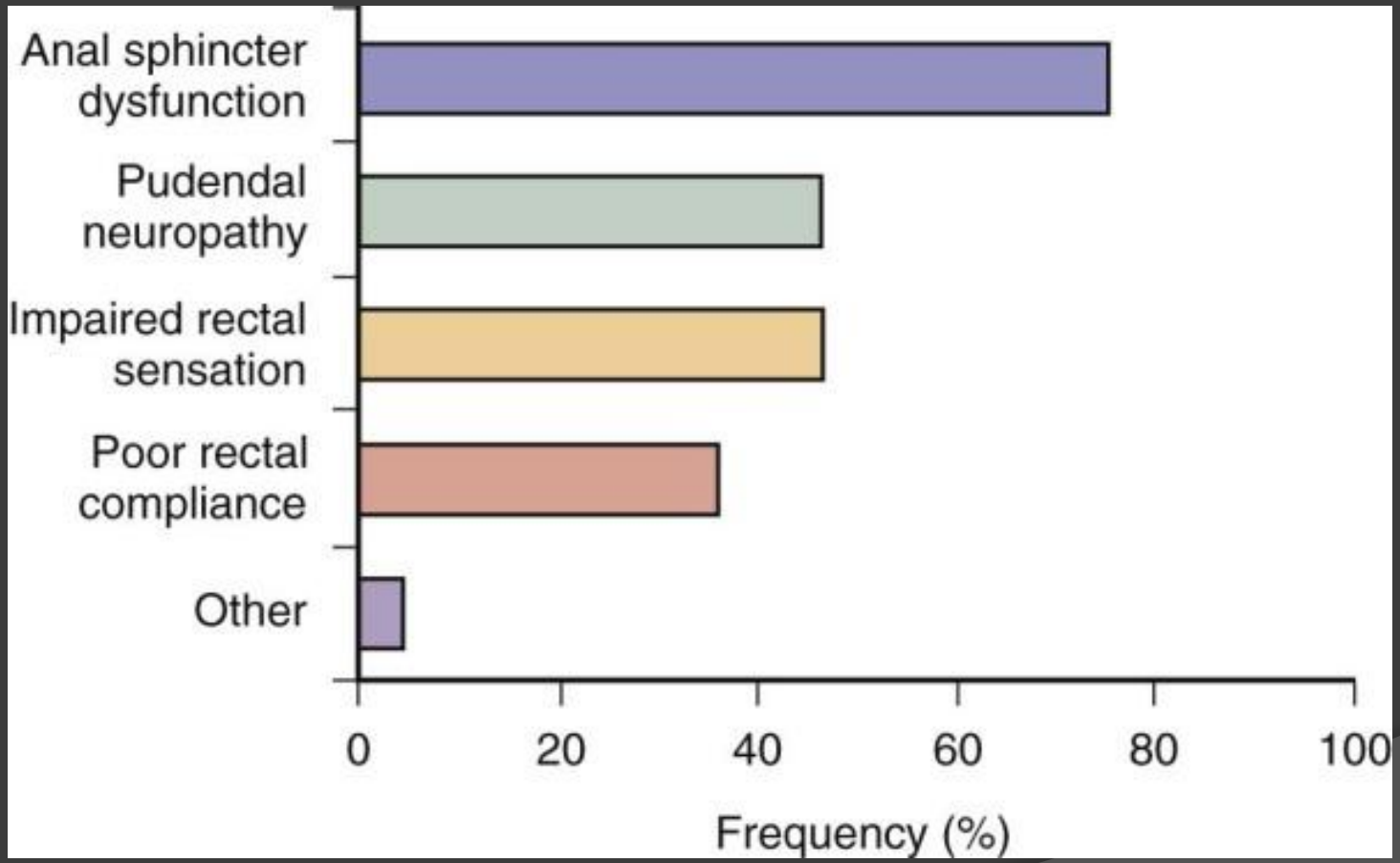
- Trauma
  - Obstetric*
  - Iatrogenic*
    - Anal stretch
    - Haemorrhoidectomy
    - Sphincterotomy
    - Fistula surgery
    - Colectomy
    - Pouch procedures
    - Radical prostatectomy (damage to nerve plexi)
  - Accidental injury
    - Impalement injury
  - Sexual
    - Anal intercourse (non-consensual more than consensual)
- Radiation damage (anal, prostatic and cervical cancer, other pelvic irradiation)
  - Via direct internal sphincter damage
  - Via radiation proctitis (and resulting diarrhoea)
- Congenital
  - Imperforate anus
  - Anal agenesis
- Colorectal
  - Rectal prolapse*
  - Prolapsing haemorrhoids
- Medical cause
  - Inflammatory bowel disease – related to diarrhoea or perianal disease
  - Irritable bowel syndrome (diarrhoea predominant)
  - Coeliac disease – related to diarrhoea
  - Diabetes mellitus – related to diarrhoea or neuropathy
  - Multiple sclerosis
  - Psychiatric illness – behavioural
  - High BMI – poor toilet hygiene
  - Debility – poor mobility
- Gastrointestinal stimulants
  - Drugs (any that cause diarrhoea)
  - Foods (caffeine, alcohol, aspartamine)
  - Osmotically active foods (lactose, sorbitol, olestra fat substitute)
- Neurological
  - Spinal cord trauma
  - Meningocele/myelomeningocele
  - Spina bifida*
- Urogynaecological
  - Pelvic organ prolapse*
  - Associated with urinary incontinence
- Cognitive impairment
  - Dementia
  - Stroke
  - Learning disability
- Degenerative
  - Internal anal sphincter degeneration*

Etiology

- Fecal incontinence occurs when one or more mechanisms that maintain continence is disrupted to the extent that other mechanisms are unable to compensate.
- Therefore, fecal incontinence is often multifactorial, and up to 80% of patients with fecal incontinence had more than one pathogenic abnormality.

Sun WM, *Gut* 1992

Etiology


Anal sphincter dysfunction
Pudendal neuropathy
Impaired rectal sensation
Poor rectal compliance
Other
0
20
40
60
80
100
Frequency (%)

Reservoir Incontinence

Pathophysiology:	↓ Compliance Rectal resection
Diagnosis:	History Sigmoidoscopy
Population:	IBD Pelvic radiation Rectal surgery

Reservoir Incontinence

- Damage to the pelvic nerves may lead to impaired accommodation and rapid transit through the rectosigmoid region.
- Damage to the motor cortex from a CNS lesion may lead to incontinence.
- Sensory impairment due to sensory and motor nerve fibers damage → impair awareness of rectal filling ↓

Impair reflex responses in the striated sphincter muscles.

Anal Sphincter Incontinence

Pathophysiology: Weakness of IAS±EAS

- Trauma-mostly obstetric
- Degeneration
- Autonomonic neuropathy

Diagnosis: History

Digital exam

Manometry

Rectal US

Anal Sphincter Incontinence

Population: adults

Middle aged /older

Scelodrema

Sphincterectomy

Obstetric Injury

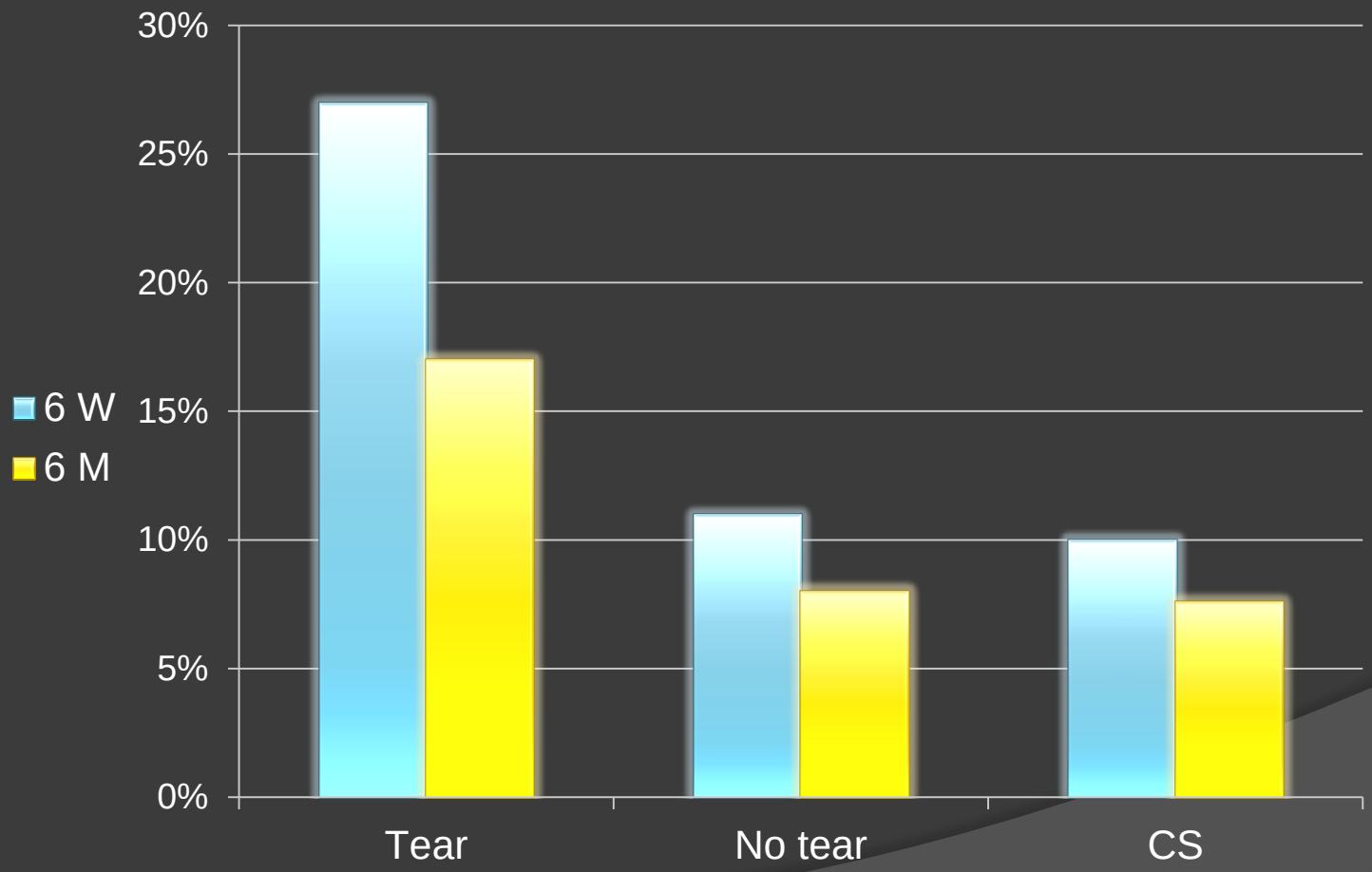
- The most common cause of anal sphincter disruption is obstetric trauma.
- May involve the EAS, IAS, or pudendal nerves.
- 35% of primiparous women showed evidence of anal sphincter disruption after vaginal delivery.
- Although usually the injury is sustained in the 20s or 30s, typically fecal incontinence presents during 50s.

Obstetric Injury

- Risk factors : Forceps-assisted delivery
  Prolonged second
  Large birth weight
  Occipitoposterior presentation
  Episiotomy
- Medial episiotomy was associated with a ninefold higher risk of anal sphincter dysfunction.

Obstetric Injury

Postpartum FI



Borello-France D Obsterctic Gynecol 2006

Nervous Dysfunction

- Pudendal neuropathy and obstetric trauma
  →Sphincter degeneration → fecal incontinence.
- The neuropathic injury is often sustained during childbirth:
  Stretching of the nerves during elongation of
  the birth canal
  Direct trauma during the passage of the fetal
  head

Age

- In men and women older than 70 years, sphincter pressures decrease by 30% to 40% compared with younger persons
- Pudendal nerve terminal motor latency is prolonged in older women.
- Pelvic floor descent is excessive on straining in older women.
- Aging is also associated with increased thickness and echogenicity of the IAS.

Hormones

- The strength and vigor of the pelvic floor muscles are influenced by hormone.
- Estrogen receptors have been identified in the human striated anal sphincter.
- Anal squeeze pressure is lower in women than men, with a rapid fall after menopause.

Surgery and Trauma

- Hemorrhoidectomy : Inadvertent damage to the IAS or loss of endovascular cushion.
- Anal dilation and lateral sphincterotomy: Fragmentation of the anal sphincters.
- Surgery for fistula.
- Perineal trauma or a pelvic fracture : Direct sphincter trauma.

Other

- IAS dysfunction :
  - Myopathy
  - Degeneration
  - Radiotherapy
- Drugs: Inhibit sphincter tone:
  - Antinticholinergics
  - Muscle relaxants

IES Vs. EAS Incontinence

Puborectalis Injury

Law Y, AJR 2008

Puborectalis Injury

- The PR is important for maintaining continence by forming a flap valve mechanism.
- Major abnormalities 40% of women and minor abnormalities 32% of women with FI.
- Impaired puborectalis (levator ani) contraction in patients with fecal incontinence.
- Improvement in puborectalis strength following biofeedback therapy was associated with clinical improvement.

Other Nervous Damage

- Cauda equena nerve injury:
  - 10% of patients with fecal incontinence
  - May be occult
  - Prolongation of nerve conduction along the cauda equina nerve roots without an abnormality in PNTML
- Combination of peripheral and central lesions is present.

Anorectal and Pelvic Floor Incontinence

Pathophysiology:

- Impaired Anorectal Sensation
- Dyssynergic Defecation
- Incomplete Stool Evacuation
- Descending Perineum Syndrome

Diagnosis:

- Digital exam
- Manometry
- Defacography
- DT-PUS

Impaired sensation

Overflow Incontinence

Overflow Incontinence

Fecal impaction → prolonged relaxation of the IAS → liquid stool flow around impacted stool and escape through the anal canal

Impaired sensation
Causes

- **Physically and mentally impairment**
- **Congenital neurologic impairment:**
  - Spina bifida
  - Myelomeningocele
  - Meningocele
- **Acquired Neurologic damage :**
  - Multiple sclerosis
  - Diabetes mellitus
  - Spinal cord injury
- **Drugs:**
  - Analgesics (Opiates)
  - Antidepressants

Incomplete Stool Evacuation

- Retention of stool in the rectum or incomplete evacuation may lead to seepage of stool or staining of undergarments.
- Dyssynergic defecation and Impaired rectal sensation are common.
- Functional incontinence: Prolonged retention of stool in the rectum → fecal impaction.

Descending Perineum Syndrome

Diarrhea Incontinence

- In the presence of large-volume liquid stools, that transit the hindgut rapidly, continence can only be maintained through intact sensation and a strong sphincteric barrier.
- Bile salt malabsorption

Lactose or fructose intolerance

Rapid dumping

Stimulants

Fiber

Laxatives

Colonic transit of colon contents is too rapid

↓

Overwhelming of the continence mechanisms