Pressure ulcers

BIUCGM
17 NOV 2017

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Pressure ulcers

Epidemiology

Hospitals:

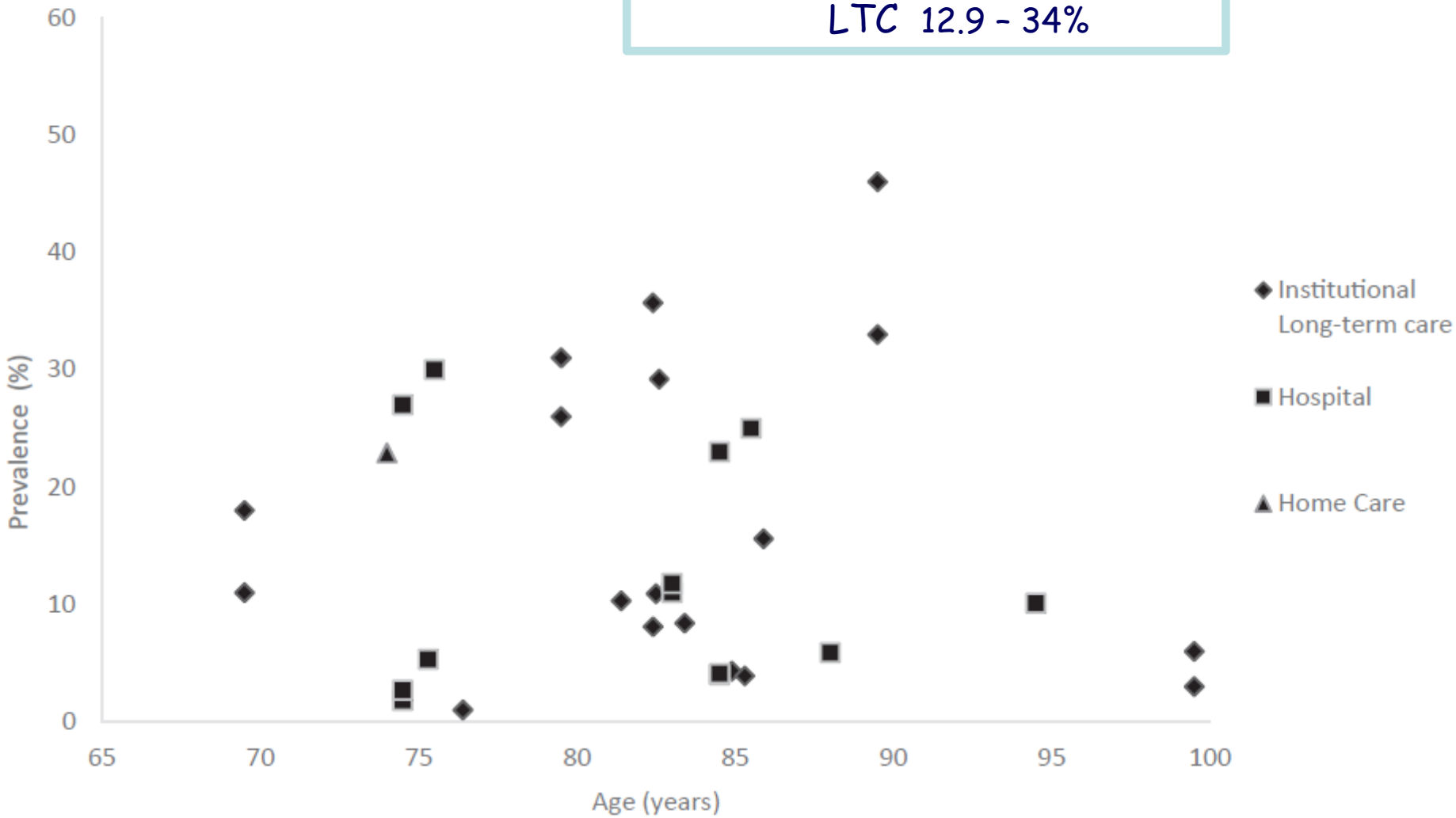
- 11-28/1000 patient-days

- 4–10% of patients admitted to acute hospitals in the UK (Clark and Watts, 1994)

- BIOMED study (Belgium, 1996): 8 – 10 %

- in US: 2.5 10^6/y pressure ulcers in acute care

prevalence: 0.3 - 46%
incidence: hosp. 0.8 – 6.7 (14.7)%
LTC 12.9 – 34%



Hahnel. J Tissue Viability 2017; 26: 20
Syst. Rev. 65+; 74 records; 20 most common skin conditions

Causes & favouring factors

1. Pressure: capillary pressure: ± 32 mm Hg

Pressure = W/surface:

os ischium region, sitting: > 300 mm Hg

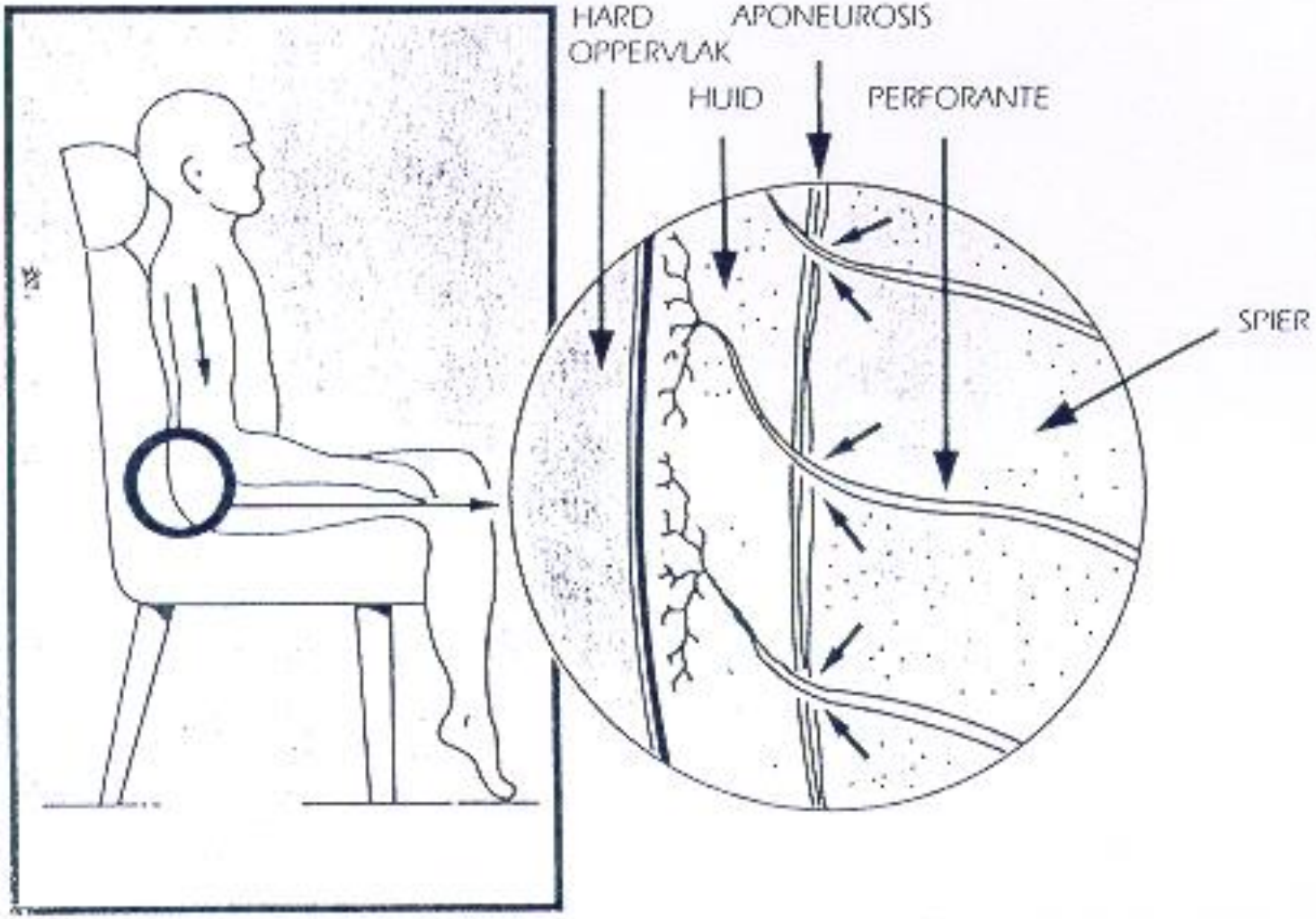
sacrum region, lying down: 70 mm Hg

heels; lying down: 45 mm Hg

→ **first lesions after 1 h !**

Causes & favouring factors

2. **Consciousness:** coma, CVA, postop, …
3. **Circulation:** hypotension, heart failure, dehydration, anemia, Aa. Insufficiency, …
4. **Subcutaneous fat:** obesity, cachexia
5. **Maceration:** transpiration, incontinence
6. **Friction:** surface (abrasio, sticking)
7. **Skin folds:** folding Aa & blocking large vessels


HARD
OPPERVLAK
APONEUROSIS
HUID
PERFORANTE
SPIER

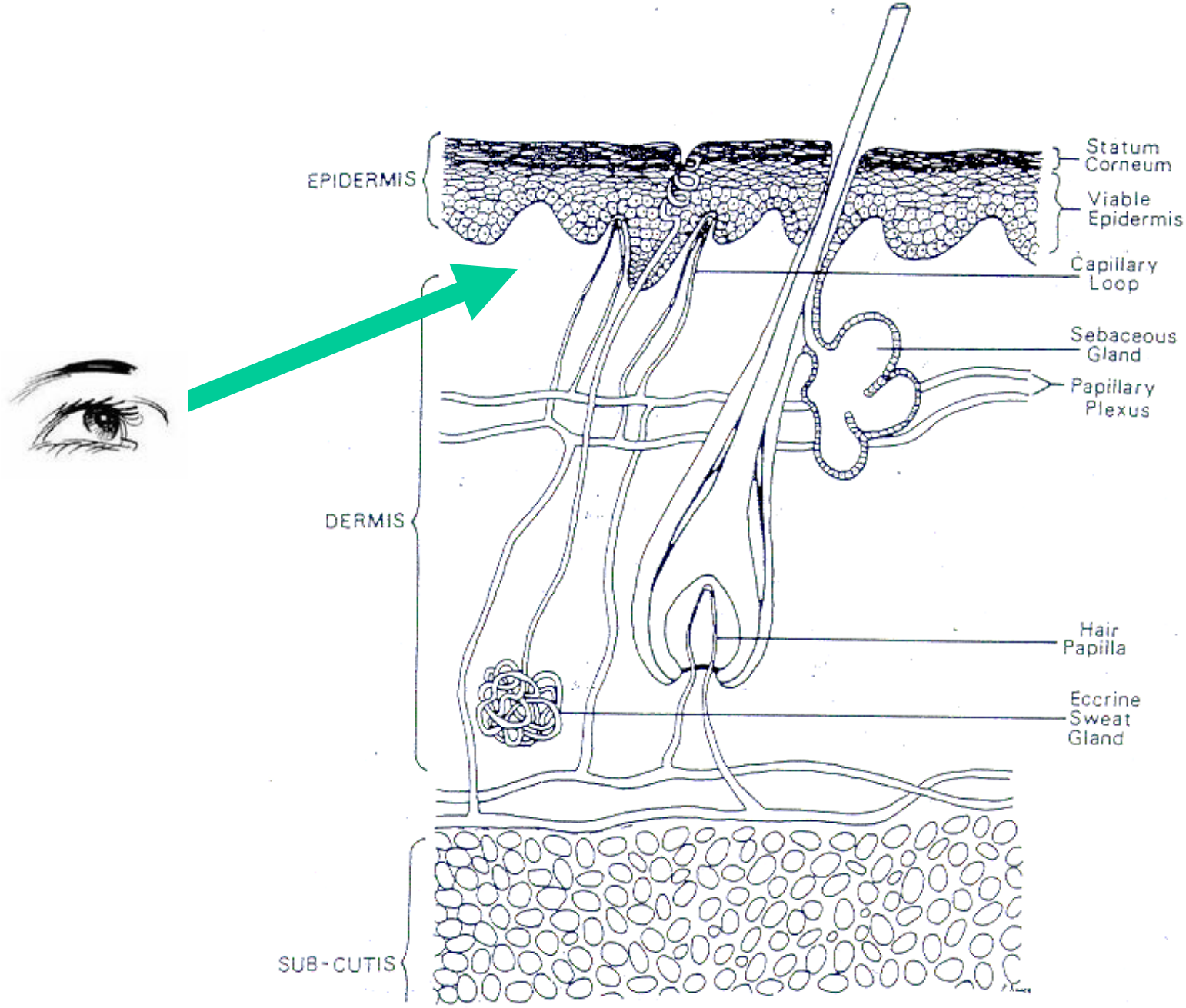


Figure 1. Schematic diagram of various units of human skin.

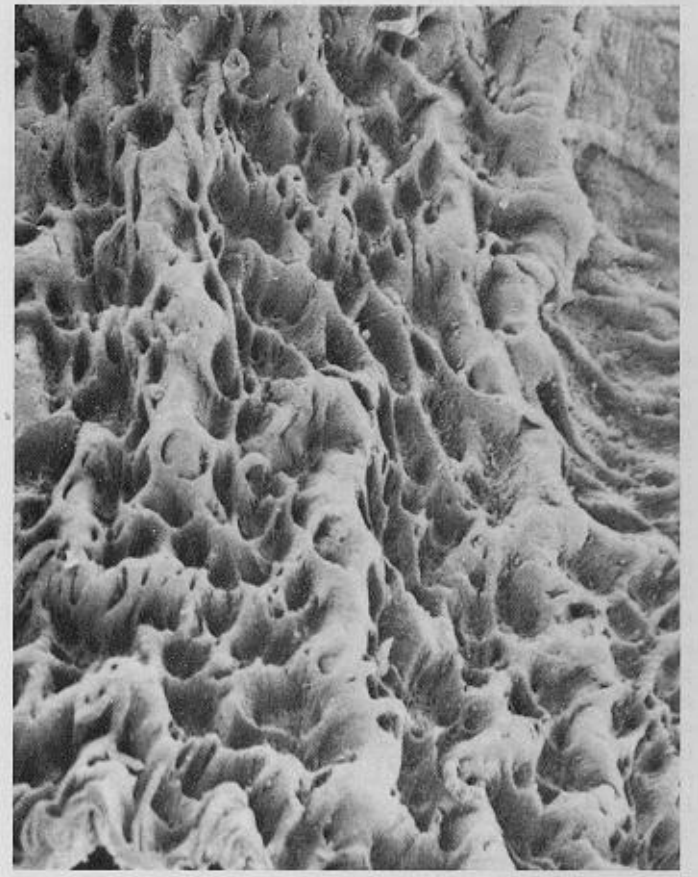


FIG 6. Scanning electron micrograph of the lower side of abdominal epidermis from a 17-yr-old woman. Note the uneven surface and compare with Fig 7 (× 50).

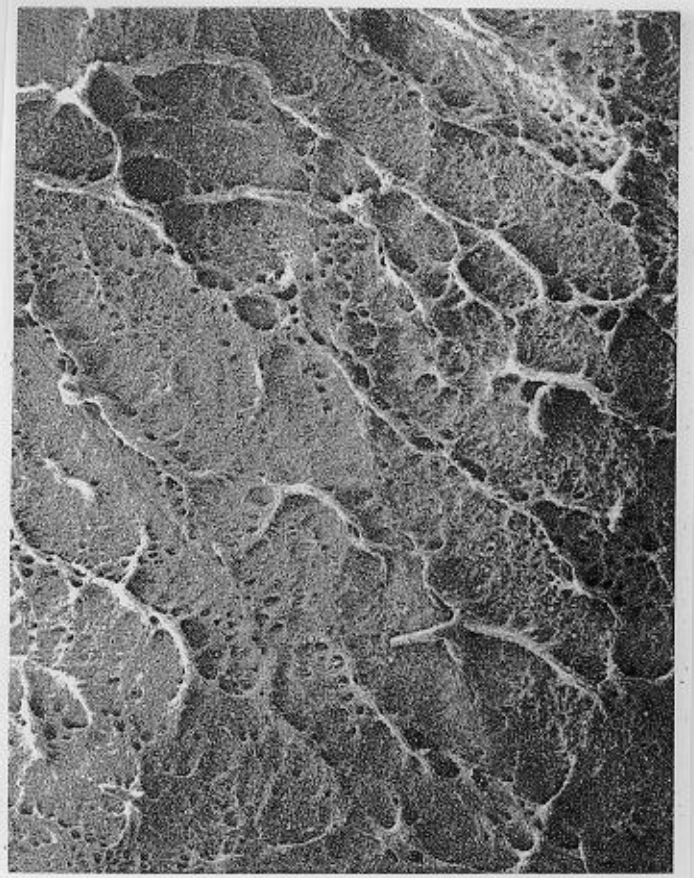
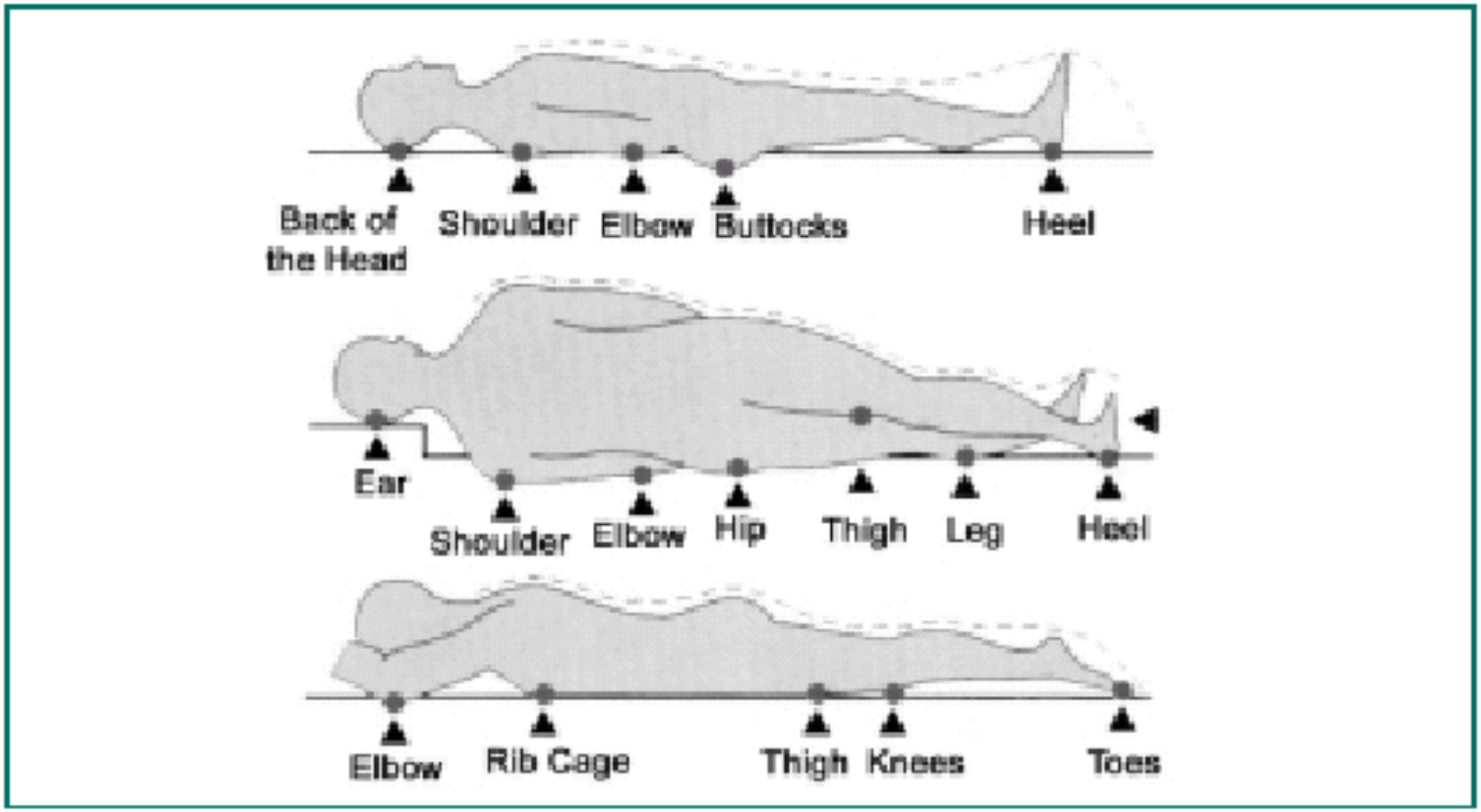


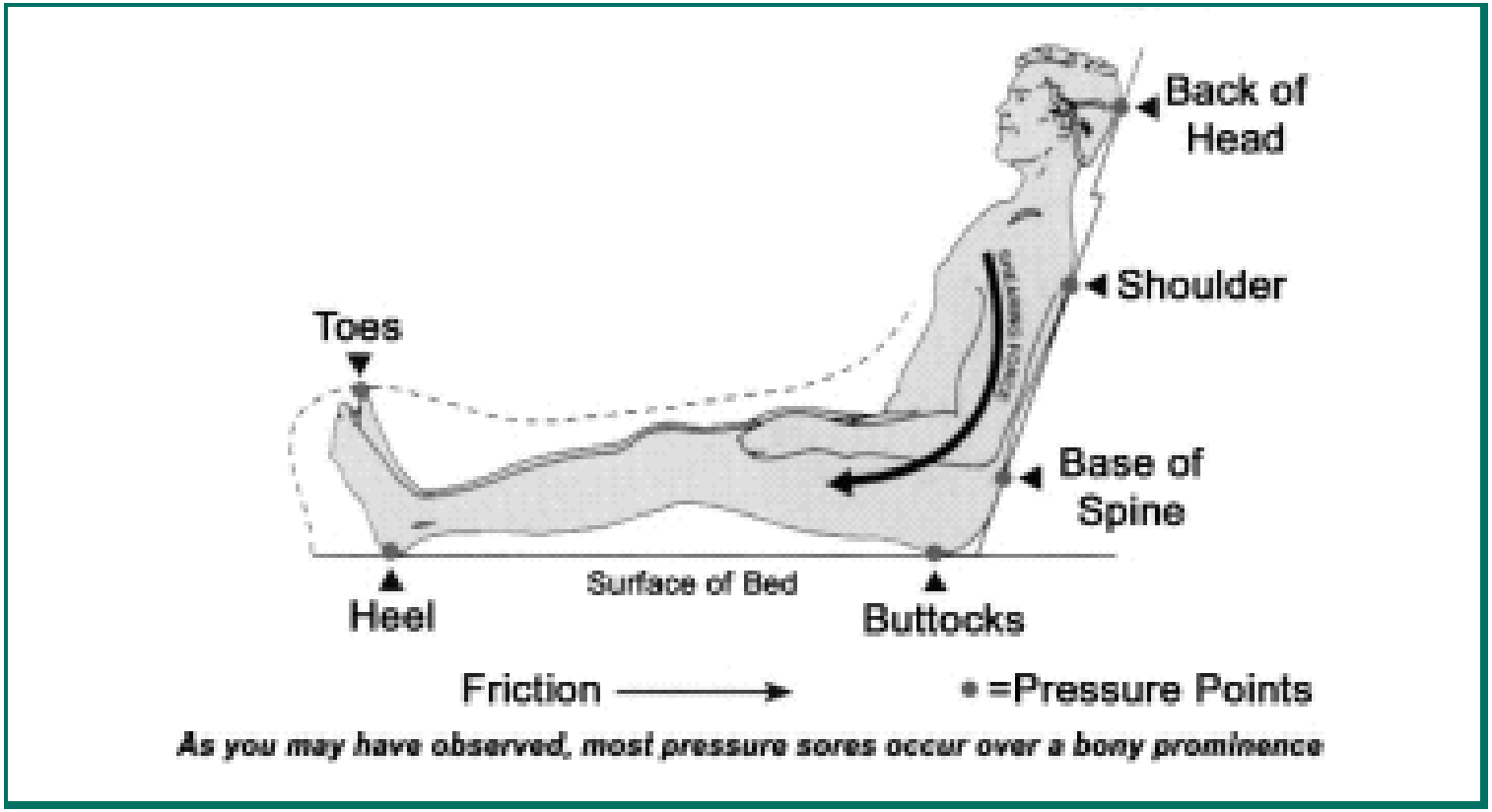
FIG 7. Scanning electron micrograph of the undersurface of abdominal epidermis of a 92-yr-old woman. Compare Fig 7: the understructure is largely flattened (× 45).

Montagna et al. J Invest Dermatol 1979; 73: 47

Common sites for pressure ulcers



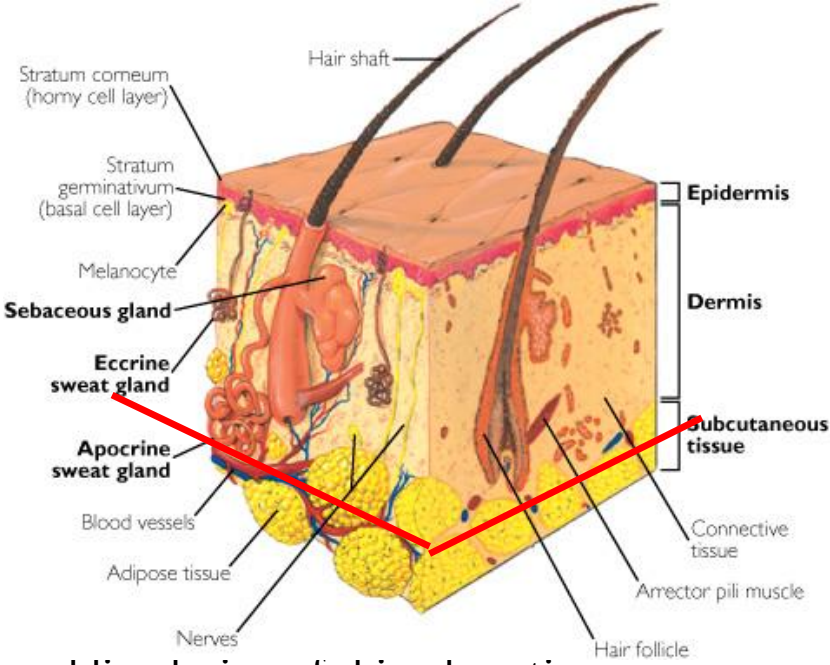
(Diagram courtesy of the Tissue Viability Society)



(Diagram courtesy of the Tissue Viability Society)

Pressure ulcers : Stages *

(2007 NPUAP staging)



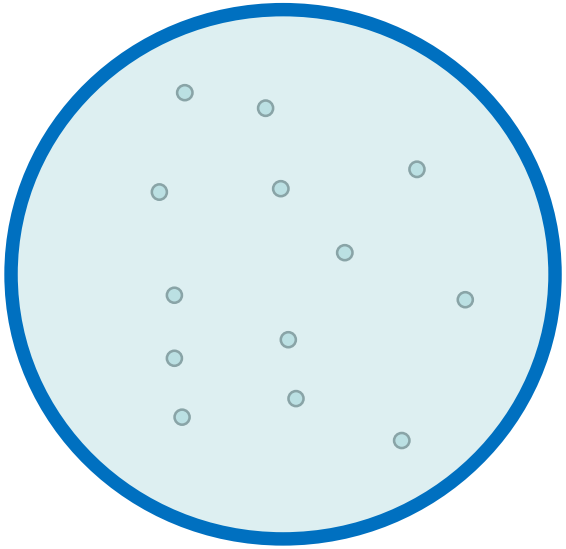
Stage I: Nonblanchable erythema of intact skin; the heralding lesion of skin ulceration.

Stage II: Partial thickness skin loss involving epidermis and/or dermis. The ulcer is superficial and presents clinically as an abrasion, blister, or shallow crater.

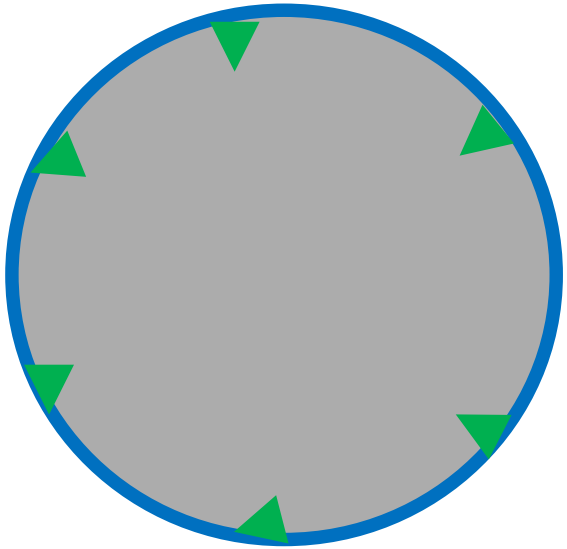
Stage III: Full thickness skin loss involving damage or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia. The ulcer presents clinically as a deep crater with or without undermining of adjacent tissue.

Stage IV: Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone, or supporting structures (for example, tendon or joint capsule). Note: Undermining and sinus tracts may also be associated with Stage IV pressure ulcers.

** Agency for Health Care Policy and Research, Public Health Service, US dept Health & Human Services, 1992*



Stage 2



Stage 3 & 4

NPUAP/EPUAP Pressure Ulcer Classification System

Category/Stage I: Non-blanchable redness of intact skin

Intact skin with non-blanchable erythema of a localized area, usually over a bony prominence. Discoloration of the skin, warmth, edema, hardness, or pain may also be present. Darkly pigmented skin may not have visible blanching. **Further description:** The area may be more painful, firmer or softer, or warmer or cooler than adjacent tissue. Category/Stage I may be difficult to detect in individuals with dark skin tones. This may indicate an at-risk individual.

Category/Stage II: Partial Thickness skin loss or blister

Partial thickness loss of dermis presenting as a shallow open ulcer with a red/pink wound bed, without slough. It may also present as an intact or open/ruptured serum-filled or sero-sanginous-filled blister.

Further description: Presents as a shiny or dry shallow ulcer without slough or bruising. This category/stage should not be used to describe skin tears, tape burns, incontinence-associated dermatitis, maceration, or excoriation.

Category/Stage III: Full thickness skin loss (fat visible)

Full thickness tissue loss. Subcutaneous fat may be visible, but bone, tendon, or muscle are not exposed. Some slough may be present. It may include undermining and tunneling.

Further description: The depth of a Category/Stage III pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput, and malleolus do not have (adipose) subcutaneous tissue, and Category/Stage III ulcers can be shallow. In contrast, areas of significant adiposity can develop extremely deep Category/Stage III pressure ulcers. Bone/tendon is not visible or directly palpable.

Category/Stage IV: Full thickness tissue loss (muscle/bone visible)

Full thickness tissue loss with exposed bone, tendon, or muscle. Slough or eschar may be present. It often includes undermining and tunneling.

Further description: The depth of a Category/Stage IV pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput, and malleolus do not have (adipose) subcutaneous tissue, and these ulcers can be shallow. Category/Stage IV ulcers can extend into muscle and/or supporting structures (e.g., fascia, tendon, or joint capsule), making osteomyelitis or osteitis likely to occur. Exposed bone/muscle is visible or directly palpable.


Stage 1 & 2


Stage 1 & 2

Stage 1 & 3; healing borders


Stage 4


Stage 4

Stage 4, healing

Prevention !

1. Risk assessment
2. Information: patient, family, staff
3. Alternating positioning: every (1), 2, (3) h
4. Aids: mattresses, pillows, …
5. Causes & favouring factors: 1-7

Treatment

1. Conservative
2. Surgery

Risk assessment

Carry out and document an assessment of pressure ulcer risk for adults being admitted to secondary care or care homes or primary and community care and emergency departments if they have a risk factor, for example:

- significantly limited mobility (for example, people with a spinal cord injury)
- significant loss of sensation
- a previous or current pressure ulcer
- nutritional deficiency
- the inability to reposition themselves
- significant cognitive impairment.

NICE, 2014

https://www.nice.org.uk/guidance/cg179

Skin assessment

Offer adults who have been assessed as being at high risk of developing a pressure ulcer a skin assessment by a trained healthcare professional.

The assessment should take into account any pain or discomfort reported by the patient and the skin should be checked for:

- skin integrity in areas of pressure
- colour changes or discoloration
- variations in heat, firmness and moisture (for example, because of incontinence, oedema, dry or inflamed skin).

NICE, 2014

Pressure ulcers – assessment tools

- **Norton**
- **Braden**
- **Waterlow**

Goal by systematic screening of all patients:
- distinction of patients at risk
- care planning and focus of resources on patients in need

NORTON PRESSURE SORE RISK ASSESSMENT SCALE SCORING SYSTEM

PHYSICAL CONDITION	GOOD	4	
	FAIR	3	
	POOR	2	
	VERY BAD	1	
MENTAL CONDITION	ALERT	4	
	APATHETIC	3	
	CONFUSED	2	
	STUPOROUS	1	
ACTIVITY	AMBULANT	4	
	WALKS WITH HELP	3	
	CHAIRBOUND	2	
	BEDRIDDEN	1	
MOBILITY	FULL	4	
	SLIGHTLY IMPAIRED	3	
	VERY LIMITED	2	
	IMMOBILE	1	
INCONTINENCE	NONE	4	
	OCCASIONAL	3	
	USUALLY URINARY	2	
	URINARY AND FECAL	1	

OVER 18	LOW RISK
BETWEEN 18 AND 14	MEDIUM RISK
BETWEEN 14 AND 10	HIGH RISK
LESS THAN 10	VERY HIGH RISK

www.health.vic.gov.au/__data/assets/file/0010/.../Norton-scale.pdf

Braden scale

SENSORY PERCEPTION ability to respond meaningfully to pressure-related discomfort	**1. Completely Limited** Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of con-sciousness or sedation. OR limited ability to feel pain over most of body	**2. Very Limited** Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has a sensory impairment which limits the ability to feel pain or discomfort over ½ of body.	**3. Slightly Limited** Responds to verbal commands, but cannot always communicate discomfort or the need to be turned. OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	**4. No Impairment** Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort..
MOISTURE degree to which skin is exposed to moisture	**1. Constantly Moist** Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	**2. Very Moist** Skin is often, but not always moist. Linen must be changed at least once a shift.	**3. Occasionally Moist:** Skin is occasionally moist, requiring an extra linen change approximately once a day.	**4. Rarely Moist** Skin is usually dry, linen only requires changing at routine intervals.
ACTIVITY degree of physical activity	**1. Bedfast** Confined to bed.	**2. Chairfast** Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	**3. Walks Occasionally** Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair	**4. Walks Frequently** Walks outside room at least twice a day and inside room at least once every two hours during waking hours
MOBILITY ability to change and control body position	**1. Completely Immobile** Does not make even slight changes in body or extremity position without assistance	**2. Very Limited** Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	**3. Slightly Limited** Makes frequent though slight changes in body or extremity position independently.	**4. No Limitation** Makes major and frequent changes in position without assistance.
NUTRITION usual food intake pattern	**1. Very Poor** Never eats a complete meal. Rarely eats more than ⅓ of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR is NPO and/or maintained on clear liquids or IV's for more than 5 days.	**2. Probably Inadequate** Rarely eats a complete meal and generally eats only about ½ of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement. OR receives less than optimum amount of liquid diet or tube feeding	**3. Adequate** Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products per day. Occasionally will refuse a meal, but will usually take a supplement when offered OR is on a tube feeding or TPN regimen which probably meets most of nutritional needs	**4. Excellent** Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.
FRICTION & SHEAR	**1. Problem** Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction	**2. Potential Problem** Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	**3. No Apparent Problem** Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.	

Braden scale

Risk	/23
Mild	15-18
Moderate	13-14
High	10-12
Severe	≤9

Bergstrom
Nurs Res 1985; 34: 383

https://www.in.gov/isdh/files/Braden_Scale.pdf

SENSORY PERCEPTION Ability to respond meaningfully to pressure-related discomfort	**1. COMPLETELY LIMITED** – Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation, **OR** limited ability to feel pain over most of body surface.	**2. VERY LIMITED** – Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness, **OR** has a sensory impairment which limits the ability to feel pain or discomfort over ½ of body.	**3. SLIGHTLY LIMITED** – Responds to verbal commands but cannot always communicate discomfort or need to be turned, **OR** has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	**4. NO IMPAIRMENT** – Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.
MOISTURE Degree to which skin is exposed to moisture	**1. CONSTANTLY MOIST**– Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	**2. OFTEN MOIST** – Skin is often but not always moist. Linen must be changed at least once a shift.	**3. OCCASIONALLY MOIST** – Skin is occasionally moist, requiring an extra linen change approximately once a day.	**4. RARELY MOIST** – Skin is usually dry; linen only requires changing at routine intervals.
ACTIVITY Degree of physical activity	**1. BEDFAST** – Confined to bed.	**2. CHAIRFAST** – Ability to walk severely limited or nonexistent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	**3. WALKS OCCASIONALLY** – Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair.	**4. WALKS FREQUENTLY**– Walks outside the room at least twice a day and inside room at least once every 2 hours during waking hours.
MOBILITY Ability to change and control body position	**1. COMPLETELY IMMOBILE** – Does not make even slight changes in body or extremity position without assistance.	**2. VERY LIMITED** – Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	**3. SLIGHTLY LIMITED** – Makes frequent though slight changes in body or extremity position independently.	**4. NO LIMITATIONS** – Makes major and frequent changes in position without assistance.
NUTRITION Usual food intake pattern [1]NPO: Nothing by mouth. [2]IV: Intravenously. [3]TPN: Total parenteral nutrition.	**1. VERY POOR** – Never eats a complete meal. Rarely eats more than 1/3 of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement, **OR** is NPO[1] and/or maintained on clear liquids or IV[2] for more than 5 days.	**2. PROBABLY INADEQUATE** – Rarely eats a complete meal and generally eats only about ½ of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement **OR** receives less than optimum amount of liquid diet or tube feeding.	**3. ADEQUATE** – Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products) each day. Occasionally refuses a meal, but will usually take a supplement if offered, **OR** is on a tube feeding or TPN[3] regimen, which probably meets most of nutritional needs.	**4. EXCELLENT** – Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.
FRICTION AND SHEAR	**1. PROBLEM**- Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures, or agitation leads to almost constant friction.	**2. POTENTIAL PROBLEM**– Moves feebly or requires minimum assistance. During a move, skin probably slides to some extent against sheets, chair, restraints, or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	**3. NO APPARENT PROBLEM** – Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair at all times.	

WATERLOW PRESSURE ULCER PREVENTION/TREATMENT POLICY

BUILD/WEIGHT FOR HEIGHT		SKIN TYPE VISUAL RISK AREAS	
AVERAGE		HEALTHY	0
BMI = 20-24.9	0	TISSUE PAPER	1
ABOVE AVERAGE		DRY	1
BMI = 25-29.9	1	OEDEMATOUS	1
OBESE		CLAMMY, PYREXIA	1
BMI > 30	2	DISCOLOURED	
BELOW AVERAGE		GRADE 1	2
BMI < 20	3	BROKEN/SPOTS	
BMI=WT(KG)/HT (m2)		GRADE 2-4	3

CONTINENCE		MOBILITY	
COMPLETE/		FULLY	0
CATHETERISED	0	RESTLESS/FIDGETY	1
URINE INCONT.	1	APATHETIC	2
FAECAL INCONT.	2	RESTRICTED	3
URINARY + FAECAL		BEDBOUND	
INCONTINENCE	3	e.g. TRACTION	4
		CHAIRBOUND	
		e.g. WHEELCHAIR	5

SEX AGE	
MALE	1
FEMALE	2
14 - 49	1
50 - 64	2
65 - 74	3
75 - 80	4
81 +	5

MALNUTRITION SCREENING TOOL (MST)
(Nutrition vol.15, no.6 1999—Australia)

A - HAS PATIENT LOST WEIGHT RECENTLY
- YES - GO TO B
- NO - GO TO C
- UNSURE - GO TO C AND SCORE 2

B - WEIGHT LOSS SCORE
- 0.5 - 5KG = 1
- 5 - 10KG = 2
- 10 - 15KG = 3
- > 15KG = 4
- UNSURE = 2

C - PATIENT EATING POORLY OR LACK OF APPETITE 'NO' = 0, 'YES' = 1

NUTRITION SCORE
IF > 2 REFER FOR NUTRITION ASSESSMENT/ INTERVENTION.

SPECIAL RISKS

TISSUE MALNUTRITION		NEUROLOGICAL DEFICIT	
TERMINAL CACHEXIA	8	DIABETES, MS, CVA	4-6
MULTIPLE ORGAN FAILURE	8	MOTOR/SENSORY	4-6
SINGLE ORGAN FAILURE		PARAPLEGIA (MAX OF 6)	4-6
(RESP, RENAL, CARDIAC)	5		
PERIPHERAL VASCULAR		**MAJOR SURGERY OR TRAUMA**	
DISEASE	5		
ANAEMIA (HB < 8)	2	ORTHOPAEDIC/SPINAL	5
SMOKING	1	ON TABLE > 2 HR#	5
		ON TABLE > 6 HR#	8

MEDICATION—CYTOTOXICS, LONG TERM/HIGH DOSE STEROIDS, ANTI-INFLAMMATORY—MAX OF 4

More than one score/category can be used.

SCORE
10 + AT RISK
15 + HIGH RISK
20 + VERY HIGH RISK

www.health.vic.gov.au/__data/assets/file/.../Waterlow-scale.pdf

Risk assessment tool	Risk factors	Scores
Braden scale (Bergstrom 1987a[5])	Sensory perception (completely limited to no impairment) Moisture (constantly to rarely) Activity (bedfast to walks frequently) Mobility (completely immobile to no limitation) Nutrition (very poor to excellent) Friction and shear (problem to no apparent problem)	Score ranges from 6 to 23*
Norton scale (Norton 1962[29])	Physical condition (very bad to good) Mental condition (stupor to alert) Activity (bedfast to ambulant) Mobility (immobile – full) Incontinent (urinary and faecal to not)	Score ranges from 5 to 20*
Waterlow scale (Waterlow 1985[48]; revised Waterlow, 2005[49])	Build/weight for height (average to below average) Skin type visual risk area (healthy to broken/spots grade 2-4) Sex (male or female) Age (14 to 81+) Continence (complete/catheterised to urinary and faecal incontinence) Mobility (fully to chair bound) Malnutrition screening tool (MST) (nutrition score) Special risk: tissue malnutrition (terminal cachexia, multiple/single organ failure, peripheral vascular disease, anaemia, smoking); neurological deficit (diabetes, MS, CVA, motor/sensory, paraplegia); major surgery/trauma (orthopaedic/spinal, on table ≥2hrs/6hrs); medication (cytotoxic, long term/high dose steroids, anti-inflammatory)	Score ranges from 2 to 20+**

The Prevention and Management of Pressure Ulcers in Primary and Secondary Care.
https://www.ncbi.nlm.nih.gov/books/NBK333156/

Table 18 Norton scale

Study	Cut-off score*	Median sensitivity**	Specificity***
Follow-up > 1 week – all stages – general population			
Kwong 2005[22]; Lincoln 1986[25]; Stotts 1998[42a]***; Wai-Han 1997[47a]	≤ 14	16 (95%CI 8 to 27) [b] range 0.0-88.9	94 (95%CI 91 to 97) [b] Range 61.0-94.4
Schoonhoven 2002[37] [c]	≤ 15	45.9 (95%CI 37 to 55)	60.3 (95%CI 57 to 63)
Pang 1998[32a]; Smith 1989[41a]	≤ 16	60 (95%CI 41 to 77) and 81 (95%CI 58 to 95)	31 (95%CI 21 to 43) and 59 (95%CI 48 to 69)

Table 16 Braden scale

Study	Cut-off score*	Median sensitivity** (range)	Specificity** (range)
Follow-up < 1 week – all stages – general population			
Bergstrom 1998[a]; Braden 1994[a]	≤ 17	59 (range 50-78)	80 (range 76-85)
Bergstrom 1998[4a]; Braden 1994[a]	≤ 18	75 (range 60-88)	68 (range 68-81)
Bergstrom 1998[a]; Braden 1994[a]	≤ 19	86.5 (range 67-100)	62.5 (range 40-73)
Follow-up < 1 week – all stages – ICU			
Serpa 2011[40] (48 hours)	≤ 12	88 (95%CI 47 to 100)	64 (95%CI 51 to 76)
Serpa 2011 (6 days)	≤ 13	75 (95%CI 35to 97)	81 (95%CI 70 to 90)
Feuchtinger 2007[15]	≤ 16	77 (95%CI 56 to 91)	30 (95%CI 14 to 50)
Follow-up > 1 week – all stages – general population			
Bergstrom 1987[a]; Bergstrom 1998[4a]; Braden 1994[a]; Capobianco 1996; Chan 2009; Goodridge 1998; Langemo 1991[23]; Lyder 1999; Pang 1998; Salvadalena 1992	≤ 18	80 (95%CI 68 to 89b (range 46.2-100)	73 (95%CI 66 to 79 [b] (range 14-100)
Bergstrom 1987[a]; Bergstrom 1998[a]; Braden 1994[a]; Capobianco 1996[8]; Salvadalena 1992	≤ 19	86 (95%CI 57 to 98) (range 71.4-100)	78 (95%CI 61 to 90) [c] (range 42.9-77.8)
Bergstrom 1987[a]; Bergstrom 1998[a]; Braden 1994[a]; Capobianco 1996; Salvadalena 1992	≤ 20	93.2 (95%CI 76 to 99) [d] (range 65-100)	43 (95%CI 32 to 55) [d] (range 31.6-66.7)
Follow-up > 1 week – all stages – ICU			
Braden 1994[7]	≤ 15	32 (95%CI 16 to 52)	95 (95%CI 87 to 99)
Braden 1994[7a]; Seongsook 2004[38a***]	≤ 16	50 (95%CI 31 to 69) and 97 (95%CI 85 to 100)	89 (95%CI 80 to 95) 26 (95%CI 17 to 37)
Braden 1994[7]	≤ 17	87.5	50.0
Follow-up > 1 week – stage 2+ – general population			
Ramundo 1995[35] [e]	≤ 17	42.9 (95%CI 10 to 82)	63.4 (95%CI 47 to 78)
Ramundo 1995[35] [e]	≤ 18	100.0 (95%CI 59 to 100)	34.1 (95%CI 20 to 51)
Ramundo 1995[35] [e]	≤ 19	100.0 (95%CI 59 to 100)	22.0 (95%CI 11 to 38)

Table 19 Waterlow scale

Study	Cut-off score*	Median sensitivity**	Specificity***
Follow-up < 1 week – all stages – general population			
Serpa 2009[39] (48 hours) [b]	≥17	71.4 (95%CI 29 to 96)	67.0 (95%CI 56 to 77)
Serpa 2009[40] (4 days) [b]	≥ 20	85.7 (95%CI 42 to 100)	41.0 (95%CI 30 to 51)
Follow-up > 1 week – all stages – general population			
Anthony 2003[2a]; Schoonhoven 2002[37]; Wai-Han 1997[47]	≥ 10	87.5 (95%CI 47 to 100)[c] range 82.3-89.6	28.2 (95%CI 22 to 35) [c] range 22.4-85.2
Anthony 2003[2] [d]	≥ 15	48.8 (95%CI 42 to 56)	94.4 (95%CI 94 to 95)
Pang 1998[32a]; Smith 1989[41a***]	≥ 16	95 (95%CI 76 to 100) and 73 (95%CI 54 to 88)	44 (95%CI 33 to 55) and 38 (95%CI 27 to 50)
Follow-up < 1 week – stage 2+ – ICU			
Weststrate 1998[50]	≥ 15	80.9 (95%CI 67 to 91)	28.5 (95%CI 25 to 33)

Provide training to healthcare professionals on **preventing** a pressure ulcer, including:

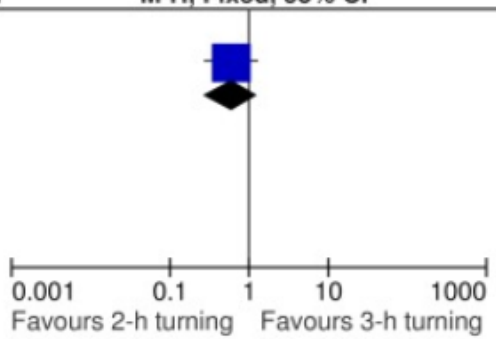
- who is most likely to be at risk of developing a pressure ulcer
- how to identify pressure damage
- what steps to take to prevent new or further pressure damage
- who to contact for further information and for further action.
- how to carry out a risk and skin assessment
- how to reposition
- information on pressure redistributing devices
- discussion of pressure ulcer prevention with patients and their carers
- details of sources of advice and support.

NICE, 2014
https://www.nice.org.uk/guidance/cg179

Study or Subgroup	2-h turning Events	2-h turning Total	3-h turning Events	3-h turning Total	Weight	Risk Ratio M-H, Fixed, 95% CI
3.15.3 2-h versus 3-h turning						
Defloor 2005	9	63	14	58	100.0%	0.59 [0.28, 1.26]
Subtotal (95% CI)		**63**		**58**	**100.0%**	**0.59 [0.28, 1.26]**
Total events	9		14			

Heterogeneity: Not applicable

Test for overall effect: Z = 1.36 (P = 0.17)



Test for subgroup differences: Not applicable

Figure 18 Different frequencies of repositioning – 2-hour turning on a standard institutional mattress versus 3-hour turning scheme: incidence of pressure ulcers (Grade II and higher)

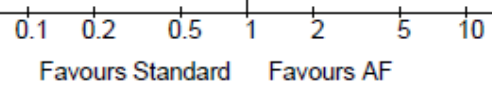
From: Appendix I, Forest plots

The Prevention and Management of Pressure Ulcers in Primary and Secondary Care.
NICE Clinical Guidelines, No. 179.
National Clinical Guideline Centre (UK).
London: National Institute for Health and Care Excellence (UK); 2014 Apr.

Review: Beds, mattresses and cushions for pressure sore treatment
Comparison: 04 Air-fluidised bed vs standard care
Outcome: 04 Proportion of patients improved

Study or sub-category	AF n/N	Standard Care n/N	RR (fixed) 95% CI	Weight %	RR (fixed) 95% CI
Allman 1987	22/31	16/34		57.43	1.51 [0.99, 2.30]
Strauss 1991	19/22	9/13		42.57	1.25 [0.84, 1.86]
Total (95% CI)	53	47		100.00	1.40 [1.04, 1.88]

Total events: 41 (AF), 25 (Standard Care)
Test for heterogeneity: Chi² = 0.44, df = 1 (P = 0.51), I² = 0%
Test for overall effect: Z = 2.20 (P = 0.03)



www.nice.uk.co The management of pressure ulcers in primary and secondary care. Final Version June 2005

Study or Subgroup	AP Events	AP Total	CLP Events	CLP Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Cavicchioli 2007	1	69	1	71	1.5%	1.03 [0.07, 16.13]
Gebhardt 1996	0	23	8	20	14.0%	0.05 [0.00, 0.84]
Malbrain, 2010	0	8	1	8	2.3%	0.33 [0.02, 7.14]
Price 1999	1	40	2	40	3.1%	0.50 [0.05, 5.30]
Stapleton 1986	11	32	26	68	25.6%	0.90 [0.51, 1.58]
Vanderwee 2005	34	222	35	225	53.5%	0.98 [0.64, 1.52]
Total (95% CI)		**394**		**432**	**100.0%**	**0.80 [0.58, 1.11]**
Total events	47		73			

Heterogeneity: $Chi^2 = 5.22$, df = 5 (P = 0.39); $I^2 = 4\%$

Test for overall effect: Z = 1.31 (P = 0.19)

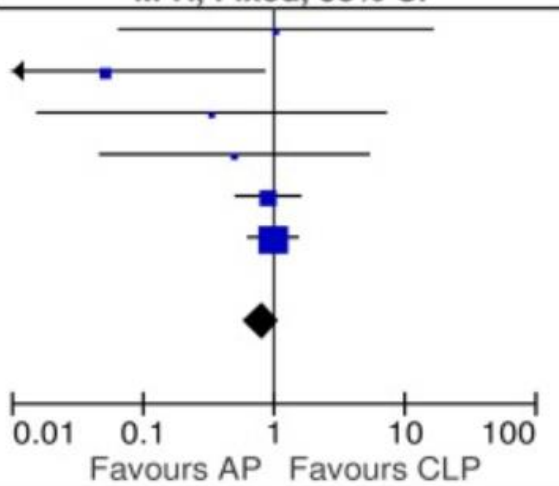
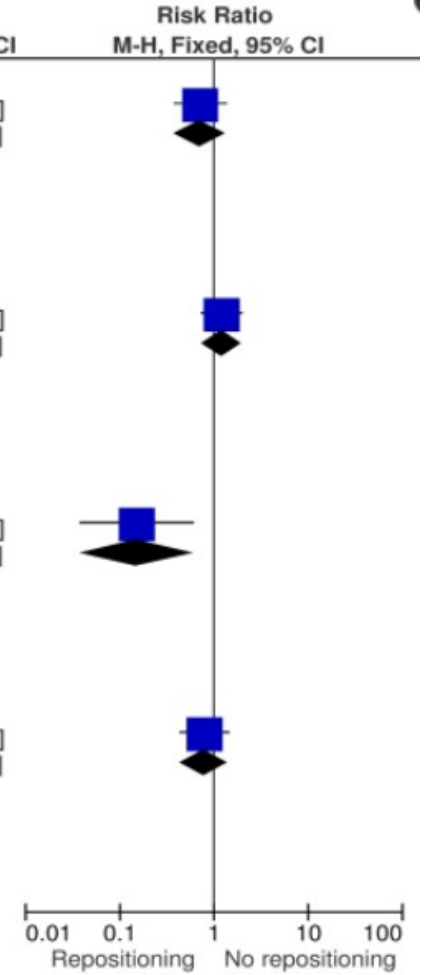


Figure 79 Incidence of pressure ulcers – grade 2+ pressure ulcers

Study or Subgroup	Repositioning Events	Repositioning Total	No repositioning Events	No repositioning Total	Weight	Risk Ratio M-H, Fixed, 95% CI
1.2.1 2-h turning scheme						
Defloor 2005	9	63	102	511	100.0%	0.72 [0.38, 1.34]
Subtotal (95% CI)		**63**		**511**	**100.0%**	**0.72 [0.38, 1.34]**
Total events	9		102			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.04 (P = 0.30)						
1.2.2 3-h turning scheme						
Defloor 2005	14	58	102	511	100.0%	1.21 [0.74, 1.97]
Subtotal (95% CI)		**58**		**511**	**100.0%**	**1.21 [0.74, 1.97]**
Total events	14		102			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.76 (P = 0.45)						
1.2.3 4-h turning+mattress						
Defloor 2005	2	66	102	511	100.0%	0.15 [0.04, 0.60]
Subtotal (95% CI)		**66**		**511**	**100.0%**	**0.15 [0.04, 0.60]**
Total events	2		102			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.69 (P = 0.007)						
1.2.4 6-h turning+mattress						
Defloor 2005	10	63	102	511	100.0%	0.80 [0.44, 1.44]
Subtotal (95% CI)		**63**		**511**	**100.0%**	**0.80 [0.44, 1.44]**
Total events	10		102			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.76 (P = 0.45)						



Test for subgroup differences: $Chi^2 = 8.36$, df = 3 (P = 0.04), $I^2 = 64.1\%$

Figure 16 Repositioning (Frequent turning or the use of pressure reducing mattress) versus no repositioning (standard care without turning): Grades 2+ pressure ulcers

From: Appendix I, Forest plots

The Prevention and Management of Pressure Ulcers in Primary and Secondary Care.
NICE Clinical Guidelines, No. 179.
National Clinical Guideline Centre (UK).
London: National Institute for Health and Care Excellence (UK); 2014 Apr.

Prevention !

1. Risk assessment
2. Information: patient, family, staff
3. Alternating positioning: every (1), 2, (3) h
4. Aids: mattresses, pillows, …
5. Causes & favouring factors: 1-7

Treatment

1. Conservative
2. Surgery

Pressure redistributing devices

- Use high-specification foam mattresses for adults with a pressure ulcer.
- Consider the use of a dynamic support surface.
- Do not use standard-specification foam mattresses for adults with a pressure ulcer.
- Consider a high-specification foam or equivalent pressure redistributing cushion for adults who use a wheelchair or sit for prolonged periods and who have a pressure ulcer.

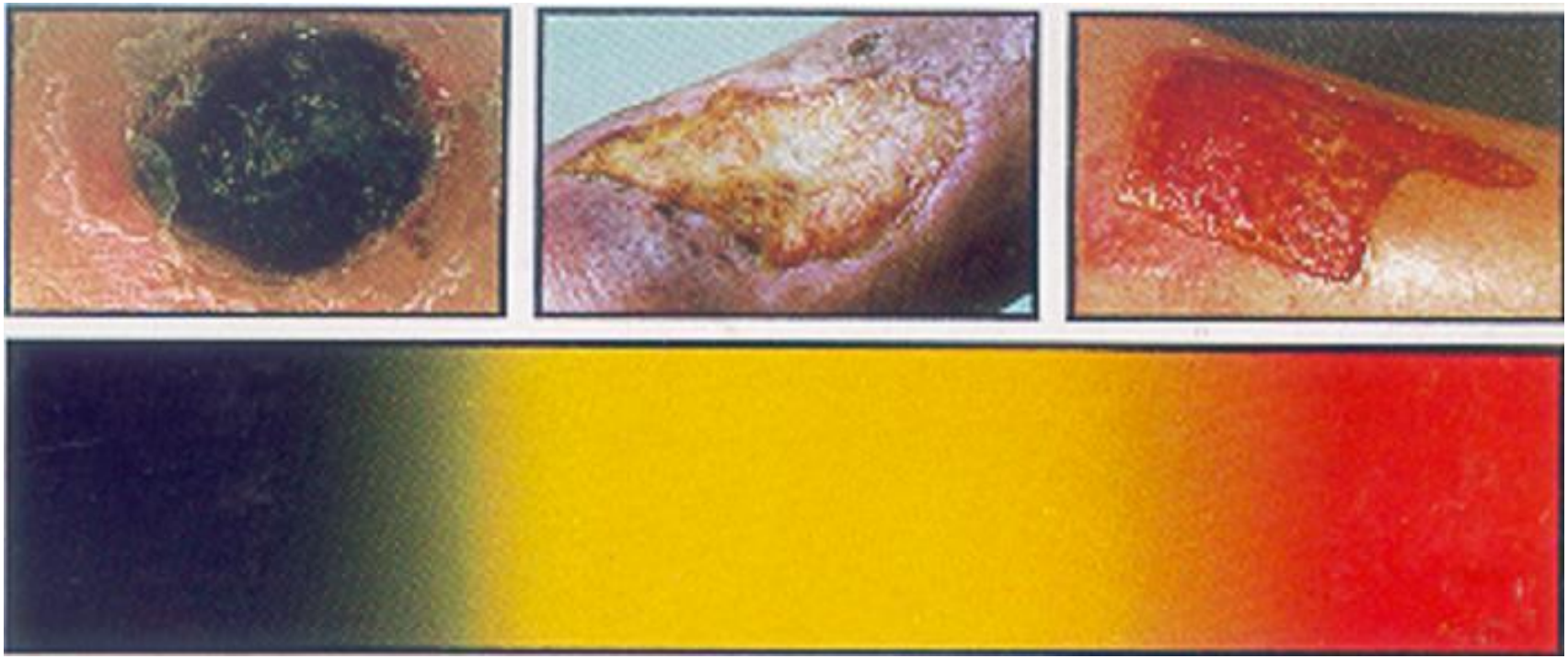
NICE, 2014

Topical antimicrobials and antiseptics
Not to be used routinely

Dressings
- Discuss with adults (and their family or carers) what type of dressing should be used, taking into account:
  - pain and tolerance
  - position of the ulcer
  - amount of exudate
  - frequency of dressing change.
- Consider a dressing that promotes a warm, moist wound healing environment for grade 2-4.
- Do not offer gauze dressings to treat a pressure ulcer in adults.

NICE, 2014

black	yellow	red
necrotic	infected	granulating



debridation	clean	protect

Table 2 (b). Types of Dressings with Some Examples of Products Commonly Used to Treat Pressure Sores

Type	Examples
Protective dressings	
Permeable	OpCit™, Tegaderm™
Hydrocolloid	DuoDERM™, Comfeel™, Tegasorb™, Ultec™
Petroleum gauze	Vaseline™, Xeroform™
Antimicrobial dressings	
Disinfectant solutions (The use of these agents remains controversial.)	Acetic acid, hydrogen peroxide, sodium hypochlorite (Dakin's), povidone iodine (Betadine™), chloramine-T (Chlorazene™)
Topical antibiotics	Silver sulfadiazine (Silvadene™), mupirocin (Bactroban™), metronidazole (Flagyl™)
Hypertonic antimicrobials	Hypertonic saline, sucrose (granulated sugar), NaCl gauze (Mesalt™)
Debriding	
Gauze dressings	Normal saline/disinfectant wet-to-dry gauze
Enzymatic products	Elase™ (fibrinolysin & DNAase), Santyl™, (collagenase), Granulex™ (trypsin), Panafil™ (papain)
Cavity filling	
Gauze dressings	Normal saline gauze, hypertonic saline gauze (Mesalt™)
Hydrocolloids	DuoDERM Hydroactive Gel™
Alginates	AlgiDERM™, DermaSORB™, Sorbsan™

Patterson et al.

JAGS 1995; 43: 919

Debridement

- Assess the need to debride considering:
  - amount of necrotic tissue
  - grade, size and extent of the pressure ulcer
  - patient tolerance
  - comorbidities.
- Use autolytic debridement & supporting dressing
- Consider sharp debridement if autolytic debridement is likely to take longer and prolong healing time.
- Do not routinely offer
  - larval (maggot) therapy
  - enzymatic debridement.
- Consider larval therapy if debridement is needed but sharp debridement is contraindicated or if there is associated vascular insufficiency.

NICE, 2014

Systemic antibiotics and antiseptics

- Offer systemic antibiotics if :
  - clinical evidence of systemic sepsis
  - spreading cellulitis
  - underlying osteomyelitis.
- Discuss with a local hospital microbiology department which antibiotic to offer against local strains of infection.
- Do not offer systemic antibiotics specifically to heal a pressure ulcer in adults.
- Do not offer systemic antibiotics to adults based only on positive wound cultures without clinical evidence of infection.

NICE, 2014

Nutritional supplements and hydration

- Offer nutritional assessment
- Offer nutritional supplements only if nutritional deficiency
- Do not offer subcutaneous or intravenous fluids to treat a pressure ulcer when hydration status is adequate.

NICE, 2014

Negative pressure wound therapy

-Do not routinely offer adults negative pressure wound therapy to treat a pressure ulcer, unless it is necessary to reduce the number of dressing changes (for example, in a wound with a large amount of exudate).

Hyperbaric oxygen therapy and electrotherapy

Do not offer electrotherapy, hyperbaric oxygen therapy.

NICE, 2014

Heel pressure ulcers

Discuss with adults with a heel pressure ulcer and, if appropriate, their family or carers, a strategy to offload heel pressure as part of their individualised care plan.

NICE, 2014

5% of Tetanus cases are due to chronic skin ulcers.
Sanford JP NEJM 1995; 332: 812

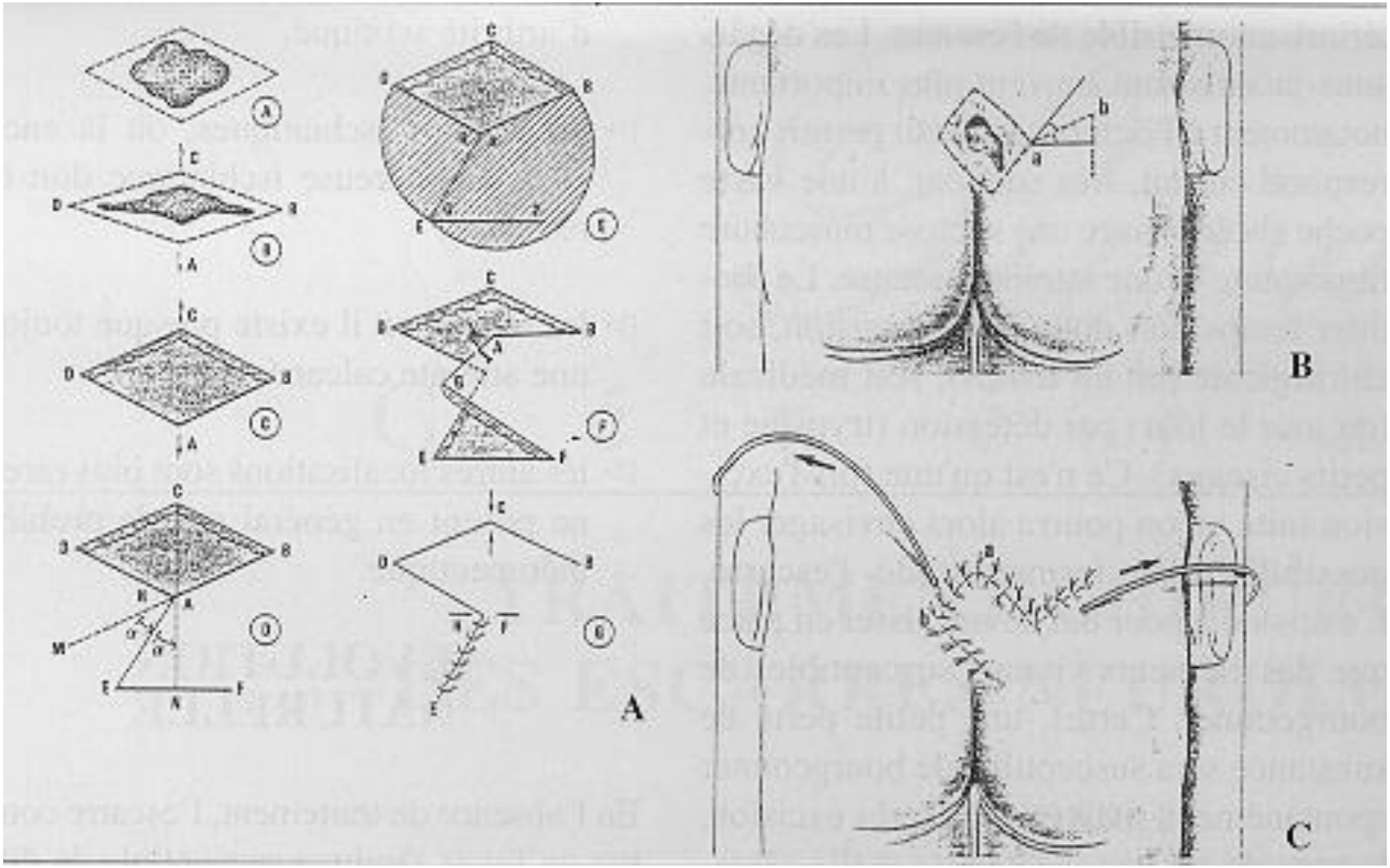
Netherlands
Tetanus antitoxin levels < 0.01 IU/ml

0-44 yr	< 5 %
45-49 yr	20 %
50-54 yr	32 %
55-59 yr	38 %
60-64 yr	42 %
65-69 yr	47 %
70-74 yr	54%

Worse in women

De Melker HE et al. Vaccine 2000: 18: 100 –108.

Belgium
49% of elderly persons have protective levels
Pepersack et al. Eur J Clin Microbiol Inf Dis 2005; 24: 495



LLL – skin flap

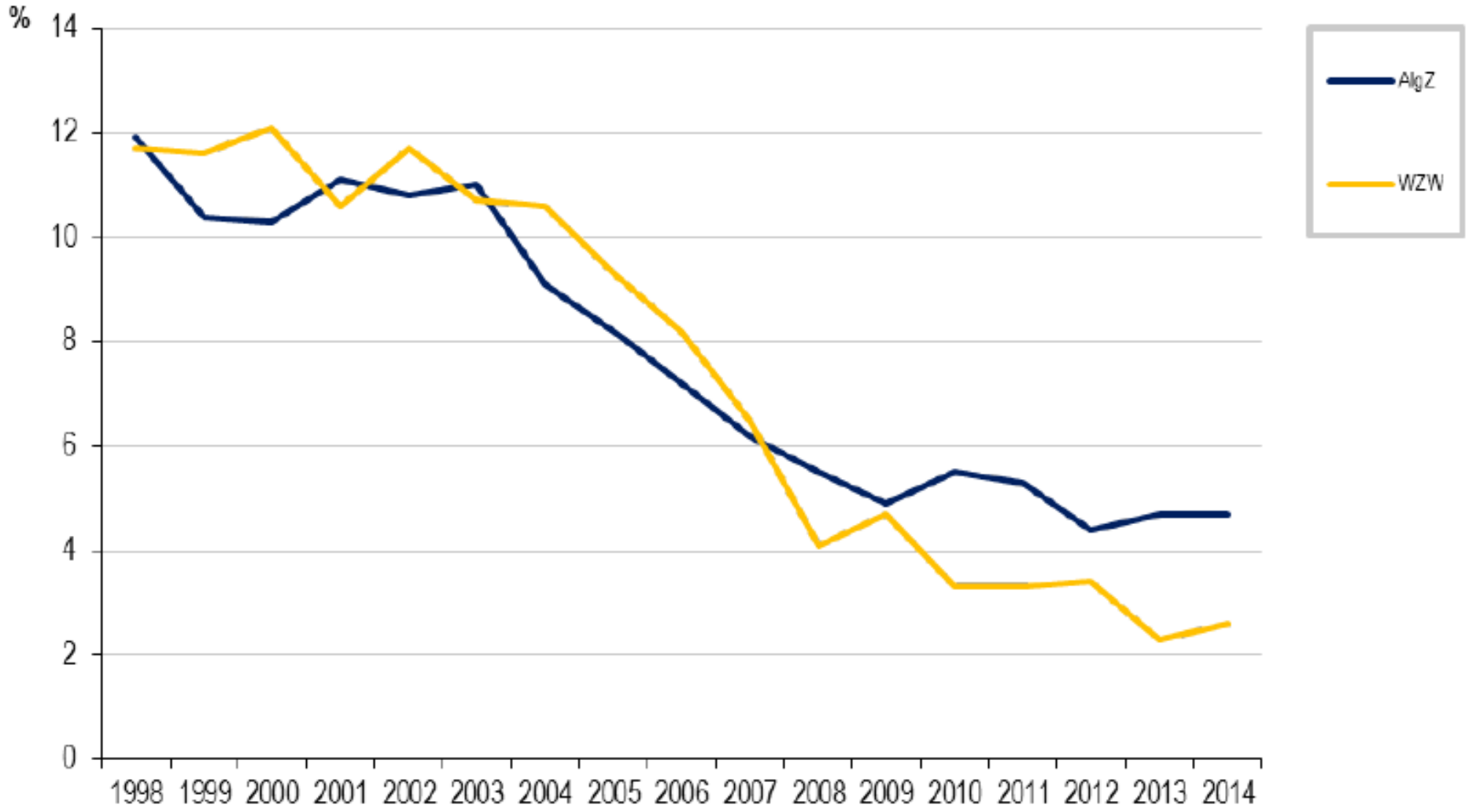
Treatment objective

- Often considered as a nursing domain
- Define your treatment goals (and do not delegate them to the specialized nursing team or surgeon)

<u>Stages 1 & 2</u>
- prevention of ulcer extension
- primary healing

<u>Stages 3 & 4</u>
- keep ulcer clean
- depending on size & general prognosis; decision to be made based on CGA:

primary healing (?)
surgical closing (?)
intervention de propreté (?)



Figuur 3.3 Prevalentie decubitus exclusief categorie 1 tussen 1998–2014 (%)

Landelijke Prevalentiemeting Zorgproblemen (Nl, 2014)
www.lpz-um.eu