# V3\_DCMODELS\_R1\_I1\_2010SEP2-DCMBradenScale v91h



# HL7 Version 3 Detailed Clinical Models (DCM) Release 1 (Universal Realm)

1st Informative Ballot

**DCM example 2 Braden Scale** 

**July 2010** 

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# Model Documentation

2	Model Detail

- 3 This document provides a complete overview of all element details. For simpler and more focused reports, simply
- 4 copy this initial template and turn off the sections not required.

# 6 Bradenscale v0.91h

# 7 Concept

- 8 This DCM will concern the determination of the risk on pressure ulcers by means of the Braden Scale. The Braden
- 9 Scale is one of the assessment scales that can be used to determine the risk on pressure ulcers. In this DCM all
- 10 concepts concerning the Braden Scale are adressed.

11

1

# 12 Mindmap

- 13 *NA*
- 14

# 15 **Purpose**

16

# 17 Purpose

18 The Bradenscale is used to determine the risk on pressure ulcers.

19

# 20 Reason

- When nurses and caregivers recognize a patient with a higher risk on pressure ulcers early on, they can take the right
- precautionary measures.

Wanneer verpleegkundige en zorgverleners een patient met een verhoogd risico op decubitus vroeg herkennen,
 kunnen zij de juiste voorzorgsmaatregelen nemen.

26

27

# **Target Users**

28 The target are patients that have limited mobility and/or malnutrition. For instance patients after surgery.

## **Evidence Base**

### General

By the inspection of healthcare pressure ulcers are seen as an important indicator for the quality of the nursing care.

The recording of the risk of pressure ulcers gives an important indication of the preventive policy in a health care setting (IGZ, 2007).

The incidence and the prevalence of pressure ulcers are still high enough to justify the attention that is asked to prevent the presence of pressure ulcers in patient in the hospital, nursing homes and at home (AHCPR, 1992). The reports of the Dutch Prevalence Measurement Health Problems (Landelijke Prevalentiemetingen Zorgproblemen) show that pressure ulcers are still seen to much (LPZ, 2008). In 2007 the prevalence of pressure ulcers declined, with the exception of the academic hospitals. In the report is written that an adequate prevention starts with the assessment of the risk of pressure ulcers. Then the correct preventive measures are needed, such as the use of anti pressure ulcer mattress and turning the patient. The assessment of the risk is of importance to determine the correct intervention to prevent pressure ulcers (LPZ, 2008)

The Dutch Prevalence Measurement Health Problems also show that, especially in the academic hospitals, the risk on pressure ulcers is recorded (in less than half of the patient population). In the general hospitals and the nursing homes, on the other hand, almost 4 out of 5 of the patients are assessed (LPZ, 2008). The measurement of the risk on pressure ulcers is done using a risk assessment list.

### Measuring devices

The risk assessment lists, there are several, are used in many settings to assess the risk on pressure ulcers.

A risk assessment scale is a evidence based measuring device in which indicators and factors are used to

A risk assessment scale is a evidence based measuring device in which indicators and factors are used, to determine the group at risk. It will always be difficult to reliably predict the development of pressure ulcers. It is unclear which factors (and combinations of factors) lead to the development of pressure ulcers in a patient. About the amount as well as the duration of the pressure and the friction and sheer, as well as the factors that determine the duration of the pressure, as well as the characteristics of the patient are of influence, there is a lot unknown. Because of this, the use of risk assessment scales leads to the right identification of the patients that need preventive measures in only a certain extend. Halfens (2000) concluded in his study for a measuring device to assess the risk on pressure ulcers that at this moment it is not possible to develop a perfectly validated instrument. There are to many factors that influence the development of pressure ulcers. Also Schoonhoven et al. (2002) indicate that the reliability of the existing instruments are under discussion.

Halfens et al. (2000) concluded in their study on the reliability, sensitivity and specificity of the Dutch Braden Scale that the use of an instrument for the assessment of the risk on pressure ulcers has a positive effect within a formal risk based program. An experienced nurse can identify high risk patients, but the use of a n assessment scale may work additionally in a practice where so many cases ask for attention. The systematic use of an assessment scale prevents base interventions of being forgotten and makes sure attention is paid to the prevention of pressure ulcers. However, the use of an assessment scale is only useful if there is also knowledge, skills, time and materials present to prevent the development of pressure ulcers(Halfens et al., 2000; Halfens, 2000).

The efficiency of risk assessment scales depends on several factors. Therefore the suggestion done in several different articles to use an assessment scale together with the clinical judgement of the nurse is probably the best intervention. Risk assessment scales are too often wrong in determining the patients at risk to base a policy only upon a scale. Next to the risk assessment scale and the clinical judgement the observation of non blanchable redness is also a predictor of pressure ulcers (Schoonhoven et al, 2002).

In this DCM the Braden Scale will be further elaborated.

# The Braden Scale

The Braden Scale for the prediction of the risk on pressure ulcers was developed for early identification of patients with a risk on pressure ulcers. The scale consists of 6 sub scales: Sensory perception, moisture, activity, mobility, nutrition and friction and sheer. Bergstrom et al. (1987) describe in their article, that the content validity and the concept validity are set by the opinions and experiences of experts. Three studies show that the Braden Scale scores high on the reliability if it is used by nurses and has a higher sensitivity and specificity than other assessment scales which previously had been published.

Many studies are done on the Braden Scale. Halfens et al. (2000) conclude that not all studies show the sensitivity and the specificity is sufficient. In their study on the reliability, sensitivity and specificity of the Braden Scale in The Netherlands, they considered whether this could be improved by adding new risk factors. That study showed that for

use in hospitals the original version of the Braden Scale, translated in Dutch, was sufficiently reliable and that the sensitivity and the specificity where sufficient. However, it appeared that a reformulation of the factors moisture and nutrition and the addition of the age of the patient can increase the sensitivity and the specificity. Also the factors of sensory perception, friction and sheer, moisture (reformulated) and the age had the highest explained variance of the risk on the development of pressure ulcers (Halfens et al., 2000).

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# Information Model

92 *Type:* Package

93 Status: Proposed. Version 1.0. Phase 1.0.

94 *Package:* Bradenscale v0.91h

95 *Detail: Created on 4-7-2009. Last modified on 12-4-2010* 96 *GUID:* {B837A4BB-FA07-43dd-BB17-A4FCA0AF42C1}

97 BradenScale has Items
98 Items has Nutrition
99 Items has Mobility

100 Items has SensoryPerception101 Items has FrictionAndSheer

102 Items has Moisture103 Items has Activity

104 Activity is a coded ordinal

105 FrictionAndSheer is a coded ordinal

106 Moisture is a coded ordinal

107 SensoryPerception is a coded ordinal

108 TotalScore is a number
109 BradenScale has TotalScore
110 Nutrition is a coded ordinal
111 Mobility is a coded ordinal

112

113 <u>Information Model</u> - (Logical diagram)

114 Created By: Michael van der Zel on 1-11-2009

115 *Last Modified:* 2-7-2010

116 *Version:* 0.91h. *Locked:* False

117 *GUID*: {7DFB541F-E463-4fa6-85FA-8F0B7F615AEB}

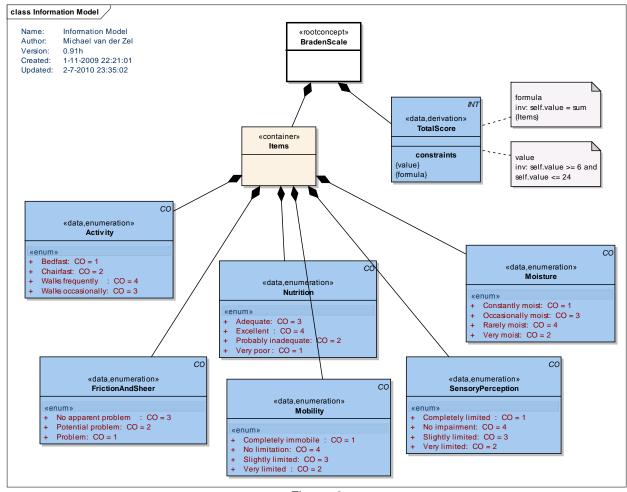


Figure: 2

# **Items**

122123 *Connections* 

119 120

<u>Connections</u>			
Connector	Source	Target	Notes
Aggregation	Public	Public	
Source -> Destination	Items	BradenScale	
Aggregation	Public	Public	
Source -> Destination	Activity	Items	
Aggregation	Public	Public	
Source -> Destination	Moisture	Items	
Aggregation	Public	Public	
Source -> Destination	FrictionAndSheer	Items	
Aggregation	Public	Public	
Source -> Destination	SensoryPerception	Items	
Aggregation	Public	Public	
Source -> Destination	Nutrition	Items	

Connector	Source	Target	Notes
Aggregation	Public	Public	
Source -> Destination	Mobility	Items	
	_		

# **BradenScale**

125126

## **Tagged Values**

- DCM::DefinitionCode1 = SCT: 413139004 |braden assessment scale|.
- DCM::DefinitionCode2 = LOINC: 38228-3 Braden Scale Skin Assessment Pnl.

127 128

## **Connections**

Connector	Source	Target	Notes	
Aggregation	Public	Public		
Source -> Destination	Items	BradenScale		
Aggregation	Public	Public		
Source -> Destination	TotalScore	BradenScale		

129

# 130 TotalScore

*Type:* 

Class INT

132 133

The total of the scores on each of the variables.

134

# **Constraints**

• value: (OCL, Status is Approved) inv: self.value >= 6 and self.value <= 24

• formula: (*OCL*, *Status is Approved*) inv: self.value = sum(Items)

135

### **Tagged Values**

• DCM::DefinitionCode = LOINC:38227-5 Braden Scale Total Score.

136 137

### **Connections**

Connections				
Connector	Source	Target	Notes	
NoteLink	Public	Public		
	TotalScore	<anonymous></anonymous>		
A	Public	Public		
<b>Aggregation</b>	Public	Public		
Source -> Destination	TotalScore	BradenScale		
NoteLink	Public	Public		
	TotalScore	<anonymous></anonymous>		
<b>Generalization</b>	Public	Public		
Source -> Destination	TotalScore	INT		

Connector	Source	Target	Notes

139

# **Activity**

140 Type: 141

**Enumeration** <u>CO</u>

142

Scores of 1 to 4 are given to the condition of the patient. The total score determines the risk factor.

143 Activity: degree of physical activity.

144

## **Tagged Values**

• DCM::DefinitionCode = LOINC:38223-4 Physical activity.

145

# Connections

Connector	Source	Target	Notes	
<b>Aggregation</b>	Public	Public		
Source -> Destination	Activity	Items		
Generalization	Public	Public		
Source -> Destination	Activity	CO		

146

147

<u>Attributes</u>		
Attribute	Notes	Constraints and tags
Bedfast CO	Confined to bed.	Default: 1
Public		
		[DCM::DefinitionCode =
		LOINC:LA6742 Bedfast ]
«enum»		
Chairfast CO	Ability to walk severely limited or	Default: 2
Public	non-existent. Cannot bear own weight and/or	
	must be assisted into chair or wheelchair.	[DCM::DefinitionCode =
		LOINC:LA9611 Chairfast ]
«enum»		
XX-11 C41	CO W.11 - 4:1 1 1	D.C. L. A
Walks frequently Public	CO Walks outside room at least twice a day and	Default: 4
rublic	inside room at least once every two hours during waking hours.	[DCM::DefinitionCode =
	during waking nours.	LOINC:LA9613: Walks frequently ]
		Lonve. LA3013. Walks frequently J
«enum»		

Attribute	Notes	Constraints and tags
Walks occasionally CO	Walks occasionally during day, but for very	Default: 3
Public	short distances, with or without assistance.	
	Spends majority of each shift in bed or chair.	[ <u>DCM::DefinitionCode</u> =
		LOINC:LA9612: Walks
		occasionally ]
«enum»		

150

# **FrictionAndSheer**

151 Type: **Enumeration** <u>CO</u>

152 153

Scores of 1 to 3 are given to the condition of the patient. The total score determines the risk factor. Friction and Shear.

154 155

Tagged Values

• DCM::DefinitionCode = LOINC:38226-7 Friction & sheer.

156

# Connections

Connector	Source	Target	Notes
Aggregation	Public	Public	
Source -> Destination	FrictionAndSheer	Items	
Generalization	Public	Public	
Source -> Destination	FrictionAndSheer	CO	
			!

Attribute	Notes	Constraints and tags
No apparent problem CO	Moves in bed and in chair independently and has sufficient muscle strength to lift up	Default: 3
Public	completely during move. Maintains good	[DCM::DefinitionCode =
	position in bed or chair.	LOINC:LA9619: No apparent problem ]
«enum»		
Potential problem CO	Moves feebly or requires minimum assistance.	Default: 2
Public	During a move skin probably slides to some	
	extent against sheets, chair, restraints or other	[DCM::DefinitionCode =
	devices. Maintains relatively good position in chair or bed most of the time but occasionally	LOINC:LA9618: Potential problem
«enum»	slides down.	

Attribute	Notes	Constraints and tags
Problem CO Public	Requires moderate to maximum assistance in moving. Complete lifting without sliding	Default: 1
«enum»	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.	[DCM::DefinitionCode = LOINC:LA9617: Problem ]

# **Mobility**

Type:

161 162

# **Enumeration CO**

163 164

Scores of 1 to 4 are given to the condition of the patient. The total score determines the risk factor. Mobility: ability to change and control body position.

165 166

## **Tagged Values**

• DCM::DefinitionCode = LOINC:38224-2 Physical mobility.

167

### Connections

Connector	Source	Target	Notes	
Generalization	Public	Public		
Source -> Destination	Mobility	CO		
Aggregation	Public	Public		
Source -> Destination	Mobility	Items		

168 169 170

### Attributes

Attribute	Notes	Constraints and tags
Completely immobile	Scores of 1 to 4 are given to the condition of the patient. The total score determines the risk	Default: 1
Public	factor. Mobility: ability to change and control body position.	[DCM::DefinitionCode = LOINC:LA9614: Completely
«enum»		immobile ]
Wellulli//		
No limitation CO Public	Makes major and frequent changes in position without assistance.	Default: 4
		[ <u>DCM::DefinitionCode</u> =
		LOINC:LA120: No limitation ]
«enum»		

Attribute	Notes	Constraints and tags
Slightly limited CO	Makes frequent though slight changes in body	Default: 3
Public	or extremity position independently.	
		[DCM::DefinitionCode =
		LOINC:LA9605: Slightly limited ]
(anum)		
«enum»		
Very limited CO	Makes occasional slight changes in body or	Default: 2
Public	extremity position but unable to make frequent	Bojann. 2
	or significant changes independently.	[DCM::DefinitionCode =
		LOINC:LA9604: Very limited ]
«enum»		

172

# **Moisture**

*Type:* <u>Enumeration</u> <u>CO</u>

173 174 175

Scores of 1 to 4 are given to the condition of the patient. The total score determines the risk factor.

Moisture: degree to which skin is exposed to moisture.

176 177

# **Tagged Values**

• DCM::DefinitionCode = LOINC:38229-1 Moisture exposure.

# 178 Connections

Connector	Source	Target	Notes
Aggregation	Public	Public	
Source -> Destination	Moisture	Items	
Generalization	Public	Public	
Source -> Destination	Moisture	CO	

179 180

181

# Attributes

Notes	Constraints and tags
Notes	Constraints and tags
Skin is kept moist almost constantly by	Default: 1
perspiration, urine, etc. Dampness is detected	
every time patient is moved or turned.	[DCM::DefinitionCode =
-	LOINC:LA9607: Constantly moist ]
	perspiration, urine, etc. Dampness is detected

Attribute	Notes	Constraints and tags
Occasionally moist CO	Skin is occasionally moist, requiring an extra	Default: 3
Public	linen change approximately once a day.	[DCM::DefinitionCode =
		LOINC:LA9609: Occasionally
		moist ]
«enum»		
Rarely moist CO	Skin is usually dry, linen only requires	Default: 4
Public	changing at routine intervals.	,
		[ <u>DCM::DefinitionCode</u> =
		LOINC:LA9610: Rarely moist ]
«enum»		
Wellulli/		
Very moist CO	Skin is often, but not always moist. Linen must	Default: 2
Public	be changed at least once a shift.	FDCM D Cald and I
		[DCM::DefinitionCode = LOINC:LA9608: Very moist ]
«enum»		Echte. Expose. Very moist j

183

185

# **Nutrition**

184 *Type:* 

**Enumeration** CO

186 S

Scores of 1 to 4 are given to the condition of the patient. The total score determines the risk factor.

Nutrition: usual food intake pattern.

187 188

# **Tagged Values**

• DCM::DefinitionCode = LOINC:38225-9 Nutrition intake pattern.

189

# Connections

Connector	Source	Target	Notes
Aggregation	Public	Public	
Source -> Destination	Nutrition	Items	
Generalization	Public	Public	
Source -> Destination	Nutrition	CO	
			!

190 191

192

**Attributes** 

Attribute	Notes	Constraints and tags
-----------	-------	----------------------

Attribute	Notes	Constraints and tags
Adequate CO Public  «enum»	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.	Default: 3  [DCM::DefinitionCode = LOINC:LA8913: Adequate ]
Excellent CO Public  «enum»	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.	Default: 4  [DCM::DefinitionCode = LOINC:LA9206: Excellent ]
Probably inadequate CO Public  «enum»	Rarely eats a complete meal and generally eats only about 2 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.	Default: 2  [DCM::DefinitionCode = LA9616: Probably inadequate ]
Very poor CO Public «enum»	Never eats a complete meal. Rarely eats more than a 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.	Default: 1  [DCM::DefinitionCode = LOINC: LA9615: Very poor ]

# **SensoryPerception**

Type: Enumeration CO

195 196 197

194

Scores of 1 to 4 are given to the condition of the patient. The total score determines the risk factor.

Sensory perception: ability to respond meaningfully to pressure-related discomfort.

198 199

# **Tagged Values**

• DCM::DefinitionCode = LOINC:38222-6 Sensory perception.

# 200 Connections

Connector	Source	Target	Notes	
Aggregation	Public	Public		
Source -> Destination	SensoryPerception	Items		
Generalization	Public	Public		
Source -> Destination	SensoryPerception	CO		

Connector	Source	Target	Notes

### Attributes

Attribute		Notes	Constraints and tags
Completely limited Public	СО	Completely limited: Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of con-sciousness or sedation OR	Default: 1  [DCM::DefinitionCode = LOINC:LA9603: Completely limited ]
«enum»		limited ability to feel pain over most of body	
No impairment CO Public		No Impairment: Responds to verbal commands. Has no sensory limitations that limit the ability to sense or express pain or discomfort.	Default: 4  [DCM::DefinitionCode = LOINC:LA9606: No impairment ]
«enum»			
Slightly limited CO Public		Responds to verbal commands, but cannot always communicate discomfortor the need to be turned.  OR has some sensory impairment which limits	Default: 3  [DCM::DefinitionCode = LOINC:LA9605: Slightly limited ]
«enum»		ability to feel pain or discomfort in 1 or 2 extremities.	
Very limited CO Public		Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has a sensory impairment which limits the	Default: 2  [DCM::DefinitionCode = LOINC:LA9604: Very limited ]
«enum»		ability to feel pain or discomfort over 1/2 of body	

# **Instructions**

Preferably the risk assessment score is combined with the daily care of the patient. So that the caregiver can combine the data of the assessment with the knowledge and experience the caregiver gets during the care giving. It is important to regularly repeat the risk assessment. The frequency depends on the patient and clinical judgement. In using one of the over 40 available instruments, in this case the "Braden Scale", a sound guide is an important condition to correctly identify patients at risk. Every nurse has to give the same meaning to every characteristic and every score as the person who developed the assessment scale. Therefore two important conditions have to be met; first the scale has to have a good explanation about the different characteristics that are to be tested (Braden has identified the items of the Braden Scale). Second the nurses that are going to use the assessment scale are to be properly trained (Defloor T., et al. 2004).

# Interpretation

- The completion is done based on the risk assessment scale according to Braden as described in the prevention guidelines. On each item a patient can score a maximum of 4 points. The total of the item scores is added. Scoring the instrument leads to a minimum of 6 and a maximum of 24 points.
- The first study of the predictive value of the Braden scale, carried out in the middle of the eighties, suggested that a total score of 16 results is the best balance between sensitivity and specificity; known as the "break-point" this value represents the point where the risk on pressure ulcers begins. In the beginning of the nineties a bigger, multi sited study has been done in which was found that a score of 18 was necessary to get this balance. Based on this study, the levels of risk on pressure ulcer are defined as:
- **•** 19-23, no risk
- **226** 15-18, mild risk
- 13-14, average risk
- **228** 10-12, high risk
- 9 or lower, very high risk
- 230 (Braden, 2005).

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On the above assessment, necessary interventions are to be considered. These interventions are mentioned in the guideline as "specific measures. The interventions are determined on the scores (the item that scored lower than 4 points is probably in need of a nurse intervention) and the clinical judgement (Zorgnetwerk Midden-Brabant, 2005).

# **Care Process**

- The outcome of a risk assessment by means of a risk assessment scale is not allowed to be the only criteria in the decision to take preventive measures.
- After the assessment of the situation of the patient and his risk on pressure ulcers a care-/ intervention plan has to be made that is consistent with the goal of the treatment. Obviously, in every patient in decisions on treatment, the quality of life should be considered. In terminal care this could mean that an invasive treatment is unwanted. In the care-/ intervention plan the assessment of the skin of the patient and a patient turning schedule must be mentioned. It is advised to evaluate the plan as soon as changes in the overall condition of the patient or the skin give a reason to

243 do so (CBO, 2002).

# **Example of the Instrument**

- 246 An example can be obtained from
- 247 http://www.merck.com/mmpe/sec10/ch126/ch126a.html

### 248 Constraints

250 See with variables / total score

# 251 **Issues**

This document specifies the correct representation of the Braden Scale for use in IT. Use in practice is due to license. That is not included in this package.

u	<b>1</b>	•	ra	n	$\sim$	0
$\mathbf{r}$			re	ш		

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307 308

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- 320 Revision suggestions will be looked at and may lead to:

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- a. revised DCM and results if accepted
- b. variations of the DCM adapted on a local situation.

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This is all based upon: a "common ownership" but not a "special stewardship".

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