



**SOLUTION ®
ALGORITHM FOR
WOUND CARE**

HEALTH TECHNOLOGY ASSESSMENT SECTION

MEDICAL DEVELOPMENT DIVISION

MINISTRY OF HEALTH MALAYSIA

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DISCLAIMER

Technology review is a brief report, prepared on an urgent basis, which draw on restricted reviews from analysis of pertinent literature, on expert opinion and / or regulatory status where appropriate. It has been externally reviewed. While effort has been made to do so, this document may not fully reflect all scientific research available. Additionally, other relevant scientific findings may have been reported since completion of this review.

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DISCLOSURE

The author of this report has no competing interest in this subject and the preparation of this report is totally funded by the Ministry of Health Malaysia.

EXECUTIVE SUMMARY

Introduction

Historically, wound care decisions were often based on clinicians' opinion varying from one practitioner to another, which resulted in inconsistent assessment, care, and wound or patient-oriented outcomes. Quality wound care is a major concern for clinicians in all patient care environments. Algorithms have been developed to expedite the clinical decision-making process. Ideally, when used by both expert and non-expert staff (such as staff registered nurses) algorithm act as a guide to optimal clinical care delivery. Algorithms are graphic maps that allow users to visualize major cognitive component and processes of a problem. Clinical algorithms enable the clinician to complete a stepwise evaluation of a specific issue in patient care. Algorithms help healthcare professional on decision-making and allow users to apply large amount of information to practical solutions. By showing the "big picture" or meta-cognitive perspectives, algorithms help organize thinking, make relationships more meaningful, and highlight crucial decision points. Because they greatly affect the quality of patient care, algorithm content and usage need to be research-based. Although many guidelines, clinical pathways, and algorithms have been developed in healthcare (including wound care), to this day few are evidence-based and content-validated for actual end-user utilization.

The Solutions® Algorithms for Wound Care is a set of visual guidelines designed to help general health care professionals assess the wound characteristics that affect subsequent goal identification and treatment.

This technology review was conducted following a request from Principal Assistant Director, Surgical Unit, Medical Development Division, Ministry of Health Malaysia.

Objective/aim

To assess the effectiveness and cost of using Solution® algorithm for wound care, not including the solutions and the dressings.

Results and conclusions

There was fair level of evidence to suggest the use of Solution® Algorithm was effective in the management of wound care. Although there was no retrievable evidence on cost-effectiveness, direct cost showed that the Solution® Algorithm seemed to be cheaper than traditional care (ointment and gauze) with or without a standardised wound management algorithm. However, the user of this algorithm must be well trained in the assessment of the chronic wound. The effectiveness, safety and cost-effectiveness of the solutions and dressings were not included in this review.

Methods

A systematic method of literature searching and selection was employed in the preparation of this review using the following databases such PUBMED, Medline Ovid, Cochrane Systematic review database via Ovid, HTA agencies and Clinical Practice Guidelines. In addition general search engine Google was searched. ConvaTec was also contacted to provide any scientific evidence available.

SOLUTION® ALGORITHM FOR WOUND CARE

1. INTRODUCTION

Historically, wound care decisions were often based on clinicians' opinion varying from one practitioner to another, which resulted in inconsistent assessment, care, and wound or patient-oriented outcomes.¹

Quality wound care is a major concern for clinicians in all patient care environments. Algorithms have been developed to expedite the clinical decision-making process. Ideally, when used by both expert and non-expert staff (such as staff registered nurses) algorithm act as a guide to optimal clinical care delivery. Algorithms are graphic maps that allow users to visualize major cognitive component and processes of a problem.²

Clinical algorithms enable the clinician to complete a stepwise evaluation of a specific issue in patient care.³ Algorithms help healthcare professional on decision-making and allow users to apply large amount of information to practical solutions.³ By showing the “big picture” or metacognitive perspectives, algorithms help organize thinking, make relationships more meaningful, and highlight crucial decision points.⁵ Because they greatly affect the quality of patient care, algorithm content and usage need to be research-based. Although many guidelines, clinical pathways, and algorithms have been developed in healthcare (including wound care), to this day few are evidence-based and content-validated for actual end-user utilization.⁴

This technology review was conducted following a request from Principal Assistant Director, Surgical Unit, Medical Development Division, Ministry of Health Malaysia.

2. OBJECTIVE/AIM

To assess the effectiveness and cost of using Solution® algorithm for wound care, not including the solutions and the dressings.

3. TECHNICAL FEATURES

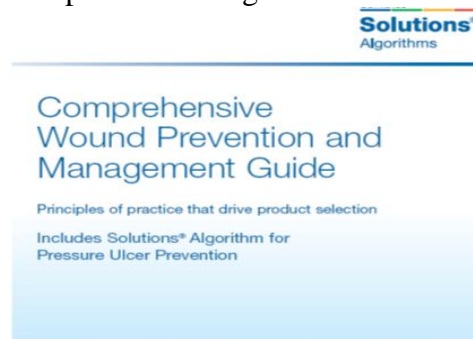
The Solutions® Algorithms for Wound Care is a set of visual guidelines designed to help general health care professionals assess the wound characteristics that affect subsequent goal identification and treatment.⁵

It consists of two components, there are:

1. Wound Care Algorithm Booklet (blue)
 - Eight wound Algorithms
 - Covers five chronic wound types (pressure ulcer, diabetic ulcer, venous ulcer, arterial ulcer, mixed etiology ulcer)



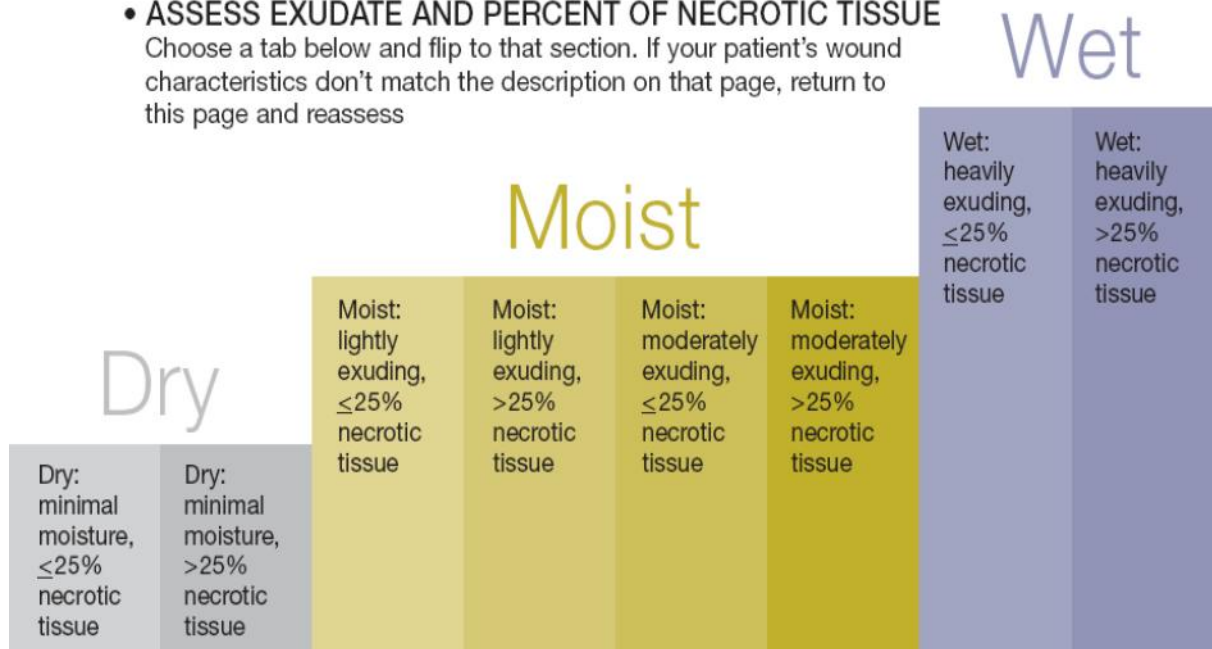
2. Comprehensive Guide Booklet (white)
- A companion piece to the Wound Care Algorithm Booklet
 - In-depth explanations of terms and concepts from Wound Algorithms
 - Full evidenced-based wound assessment
 - One Wound prevention Algorithm



Solutions[®] Algorithm identifies wounds by the level of necrotic tissue, specifically equal to or less than 25% or greater than 25% necrotic tissue and the amount of moisture (or exudate) present, specifically dry, moist, or wet. There are 8 algorithms based on the level of exudate and level of necrotic tissue. Four algorithm focus on <25% necrotic tissue, while the other 4 algorithm focus on >25% necrotic tissue. (Refer appendix 1 for detail)

• **ASSESS EXUDATE AND PERCENT OF NECROTIC TISSUE**

Choose a tab below and flip to that section. If your patient's wound characteristics don't match the description on that page, return to this page and reassess



It is claimed that Solutions[®] Algorithms is the only comprehensive chronic wound care algorithm approved by the United States (U.S.) government known as the U.S. National Guideline Clearinghouse[™] (NGC) for the assessment and treatment of wounds regardless of etiology. Solutions[®] Algorithms was first accepted by the NGC in 2006 and remains the only comprehensive set of content-validated and evidence based wound care algorithm.

The company claimed that there are over 300 hospitals in the US utilizing Solutions[®] Algorithms. In addition, there are also over 1,000 home health agencies and long term care facilities combined in the US which are using Solutions[®] Algorithms.

The wound dressing products used range from: (e-mail communication 13 May 2011)

1. DuoDERM[®] Hydroactive[®] Gel
2. DuoDERM[®] CGF[®] Dressing
3. DuoDERM[®] Extra Thin Dressing
4. Kaltostat[®] Alginate Dressing
5. Aquacel[®] Hydrofiber[®] Dressing
6. Aquacel[®] Ag Hydrofiber[®] Dressing with Ionic silver
7. Versiva[®] XC[®] Gelling Foam Dressing
8. Aquacel[®] Ag Surgical Dressing with Ionic silver*
9. CombiDERM[®] Dressing*

10. CarboFLEX® Odor Control Dressing*

*Not available in HKL. CombiDERM was not brought into Asia but is similar to the Versiva XC and may be used interchangeably. For the Pilot study, the departments are using the dressings listed above from 1-7 and most of the wards in HKL have been using these products for years.

As for the wound cleansing solutions, the solutions recommended in the algorithm are SAF-Clens AF® Dermal Wound Cleanser and Shur-Clens® Wound Cleanser.

4. METHODS

4.1 Searching

A systematic method of literature searching and selection was employed in the preparation of this review using the following databases such as PUBMED, Medline Ovid, Cochrane Systematic review database via Ovid, HTA agencies and Clinical Practice Guidelines with the following text word algorithm, algorithm\$, Solution® algorithm, algorithm*, protocol, pathway, wound care, chronic wound, acute wound, pressure sore either singly or in combination. In addition general search engine Goggle was searched. ConvaTec was also contacted to provide any scientific evidence available.

4.2 Selection

Published articles related to the effectiveness and cost implications of Solutions® Algorithms in wound care were included. Relevant articles were critically appraised and evidence graded according to US/Canadian Preventive Services Task Force (Appendix 2).

5. RESULTS AND DISCUSSION

There were ten potential relevant titles identified by the search strategy. Only three articles related to algorithm were found relevant. These papers were fully appraised and included in this report. There were two cross sectional studies, and one comparative prospective study which also include cost evaluation.

5.1 Clinical effectiveness

Beitz JM, van Rijswijk L carried out a cross sectional study to validate wound care algorithm among 240 non-wound experts licensed registered nurses in the U.S. The results showed that registered nurse participants rated the algorithm generally valid and appropriate, help them match the wound to the appropriate primary algorithm (most correct choice) and subsequently selected the correct dressing for the displayed wound. The proportion of nurse selecting the correct algorithm was higher for photographic wound without necrotic tissue (80%) than those with necrotic tissue (50%).^{6 level II-3}

Bolton L, McNees P, van Rijswijk L, *et al.* conducted a prospective multicentre study on wound healing outcomes using standardized assessment and care on patient in three long term care facilities (LTAC), one long term acute care hospital (HC) and 12 home care agencies for wound selected to receive care used online software derived from the Pressure Sore Status Tool, the

Braden Scale and Solution Algorithm of wound care on stage II pressure ulcers or partial-thickness venous ulcers. The results showed that the proportion of wounds healing within 12 weeks of care or less ranged from 2% (pressure ulcer in the LTAC setting) to 100% (arterial ulcers in HC). Most wounds in the database were pressure ulcers or venous ulcers receiving care in the home telemedicine setting. In this setting, during the first 12 weeks of care, 52% of pressure sore healed, whereas 67% of venous ulcers healed. Mean time for healing was approximately twice longer for full thickness wound compared to partial thickness wound, with 36% of the full thickness pressure ulcers healed in an average of 62 days (SD= 54). In contrast, 61% of the partial thickness pressure ulcers healed in an average of 31 days (SD = 41) [$p < .001$]. Forty four percent of the full thickness venous ulcers healed in a average of 57 days (SD = 45).¹¹
level II-3

A comparative prospective study in Japan by Ohura T, Sanada H, Mino Y evaluated the actual cost of care with (1) the modern dressing with a standardised wound management algorithm (MC/A) (2) traditional care (ointment and gauze) with a standardised wound management algorithm (TC/A) and (3). the traditional care (ointment and gauze) without a standardised wound management algorithm (TC/Na) The study result revealed that when stage 2 and 3 pressure ulcers were grouped, MC/A managed patients showed the best scores (11.1 points reduction), followed by TC/Na and TC/A groups (9.0 and 6.9 points reduction, respectively). Statistical significance existed ($p = 0.046$) between the MC/A and TC/A groups. When stages 2 and 3 ulcers were analyzed as separate groups, results with MC/A were better than those obtained with TC/A or TC/Na, although no significance was reached due to the reduced sample size.⁷ level II-3

Through personal communication with the Company representative on 13 May 2011, it was informed that there was a pilot study using this algorithm being carried out in Hospital Kuala Lumpur (HKL) since October 2010. The study did not use the recommended solution as prescribed in the algorithm, because these products were currently not available in Asia. Hence the cleaning solution used for wound cleaning was normal saline.

For Wound Cleansing solutions, the solution recommended in the algorithm are SAF-Clens AF® Dermal Wound Cleanser and Shur-Clens® Wound Cleanser. However, these products have not yet brought into Asia. At present, HKL is doing the Pilot Study using normal saline as the wound cleanser.

6. CONCLUSION

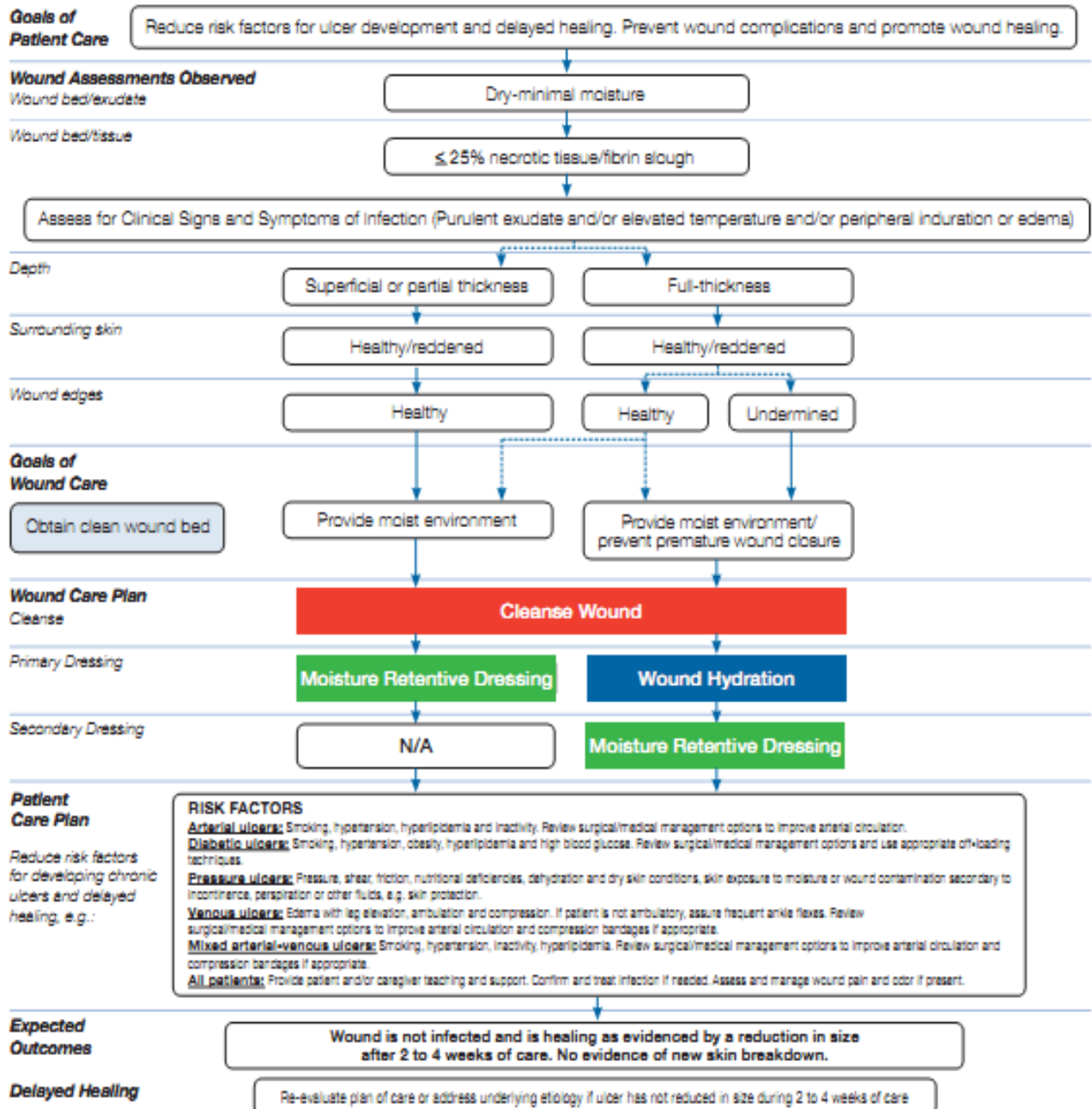
There was fair level of evidence to suggest the use of Solution[®] Algorithm was effective in the management of wound care. Although there was no retrievable of evidence on cost-effectiveness, direct cost showed that the Solution[®] Algorithm seemed to be cheaper than traditional care (ointment and gauze) with or without a standardised wound management algorithm. However, the user of this algorithm must be well trained in the assessment of the chronic wound. The effectiveness, safety and cost-effectiveness of the solutions and dressings were not included in this review.

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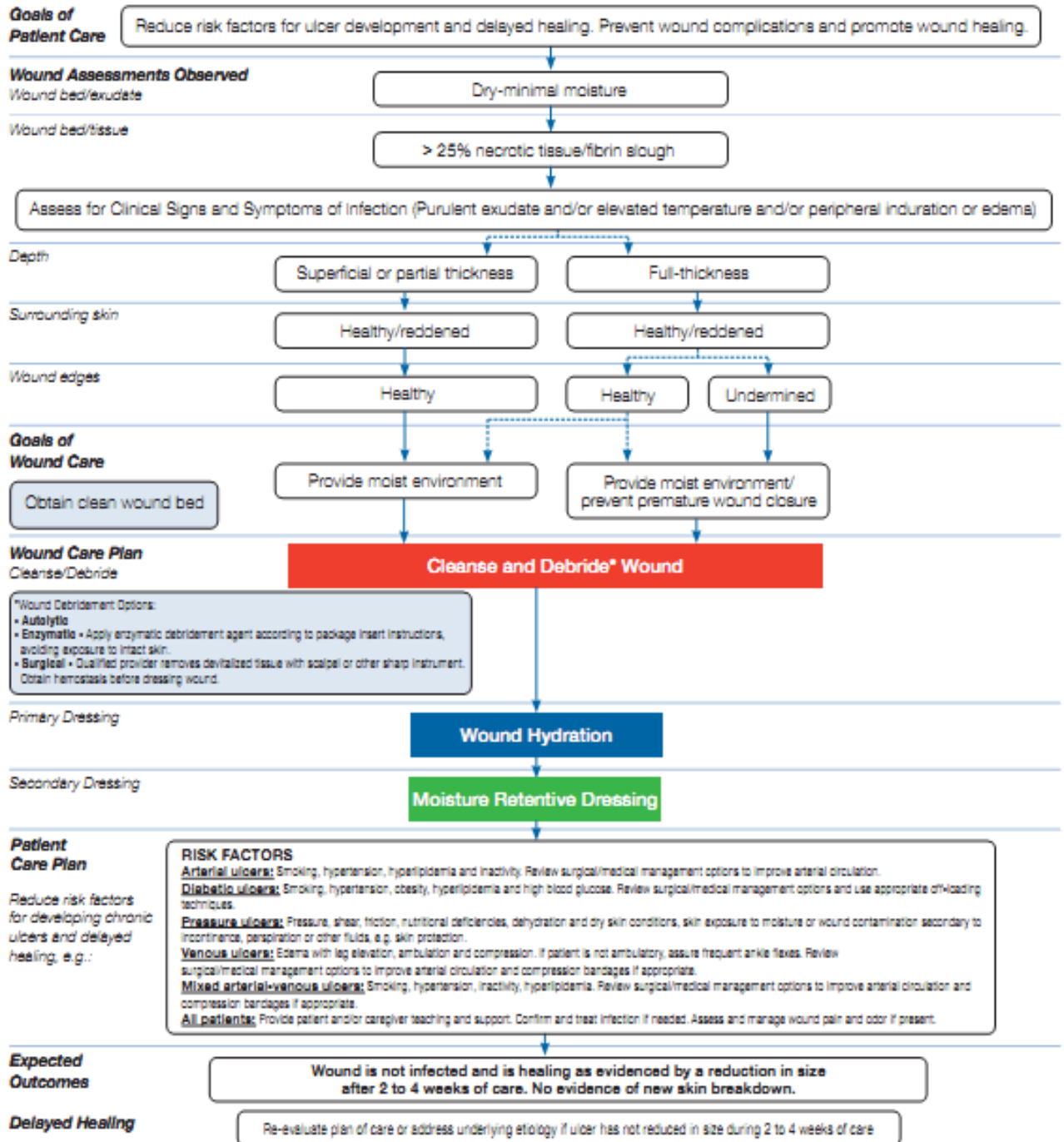
1. Dry, $\leq 25\%$ Necrotic Tissue

Medical Diagnosis: Acute or Chronic Wound Nursing Diagnosis: Skin Integrity Impaired or Tissue Integrity Impaired



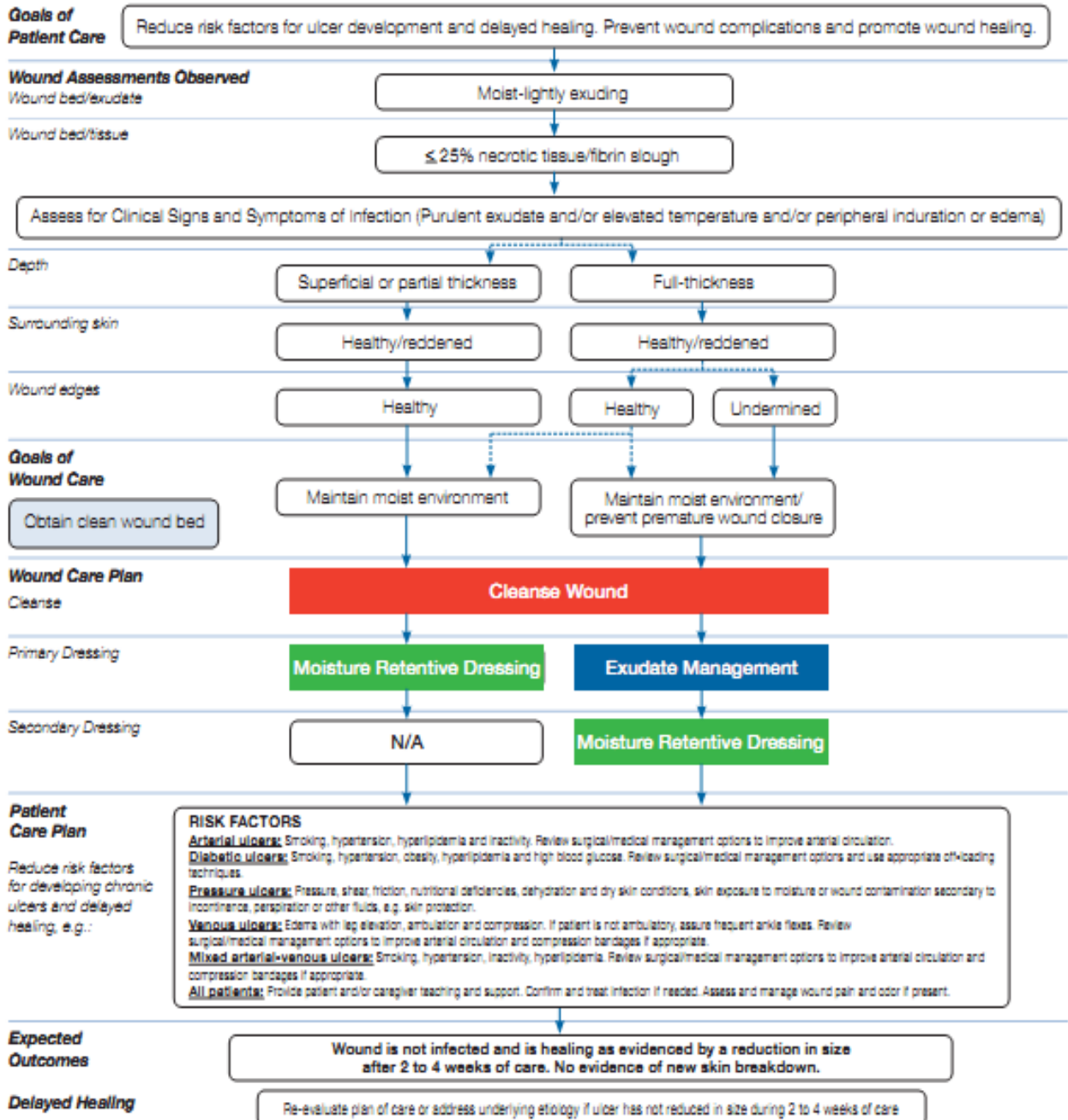
2. Dry, > 25% Necrotic Tissue

Medical Diagnosis: Acute or Chronic Wound Nursing Diagnosis: Skin Integrity Impaired or Tissue Integrity Impaired



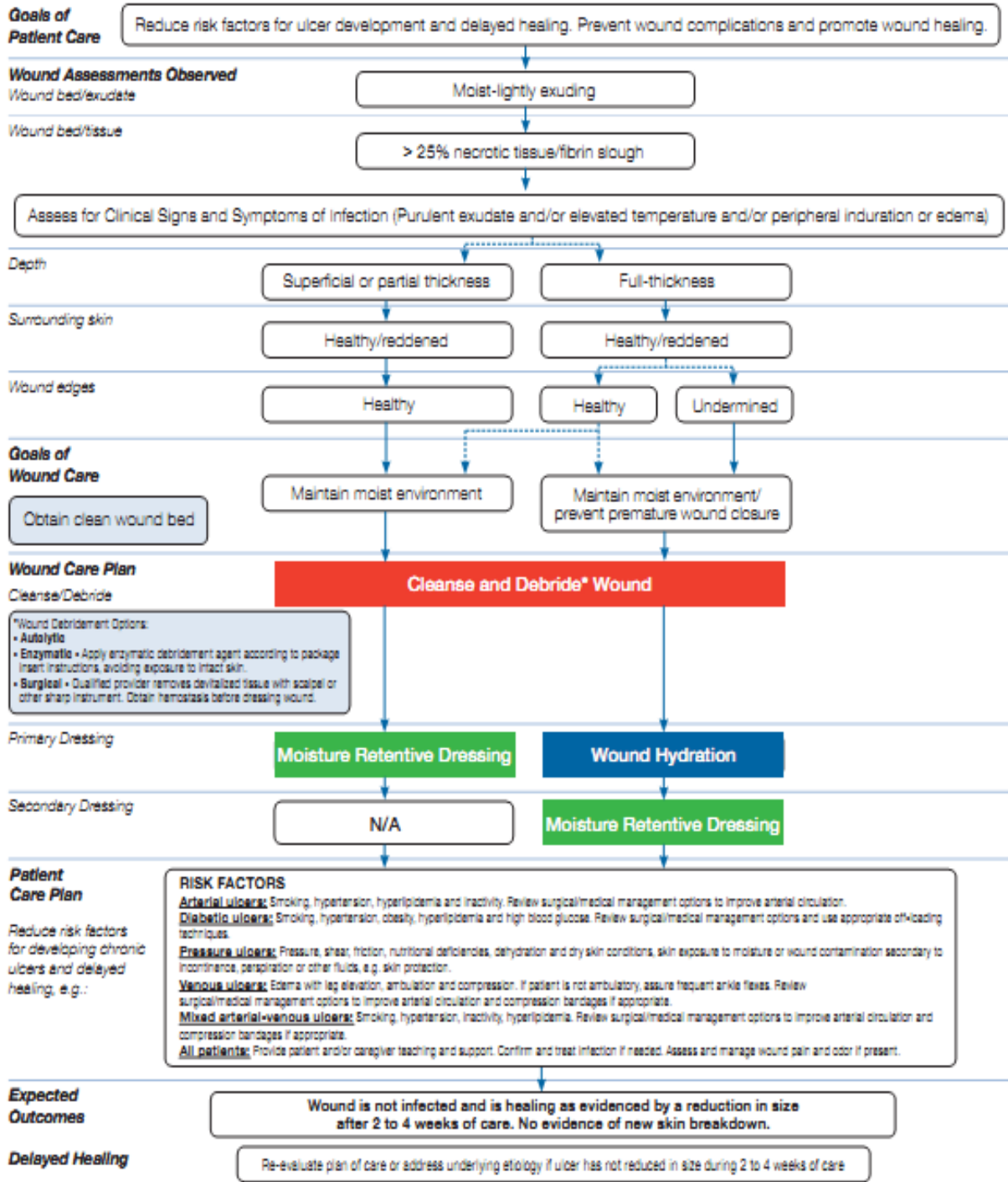
3. Moist, \leq 25% Necrotic Tissue

Medical Diagnosis: Acute or Chronic Wound Nursing Diagnosis: Skin Integrity Impaired or Tissue Integrity Impaired



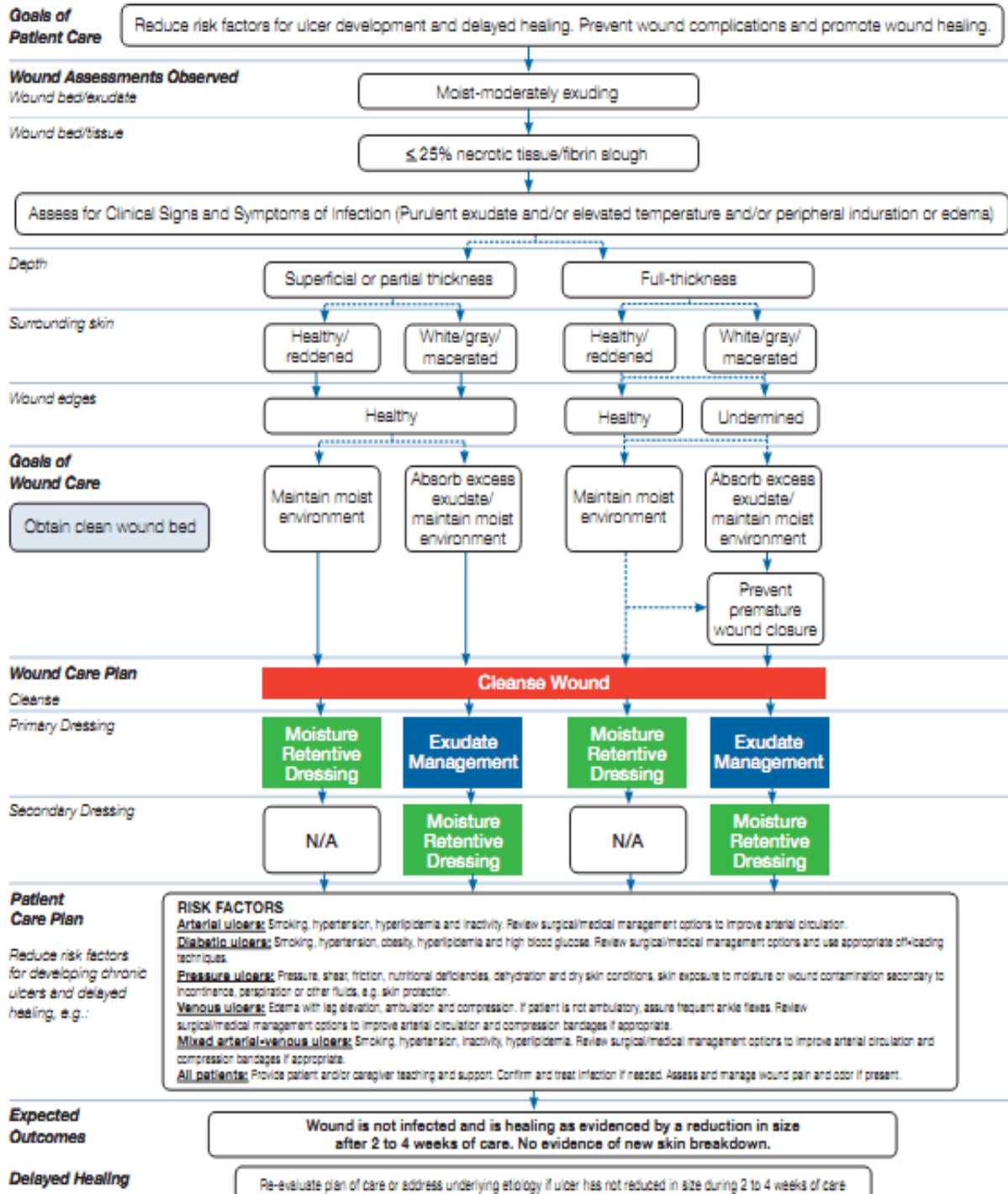
4. Moist, > 25% Necrotic Tissue

Medical Diagnosis: Acute or Chronic Wound Nursing Diagnosis: Skin Integrity Impaired or Tissue Integrity Impaired



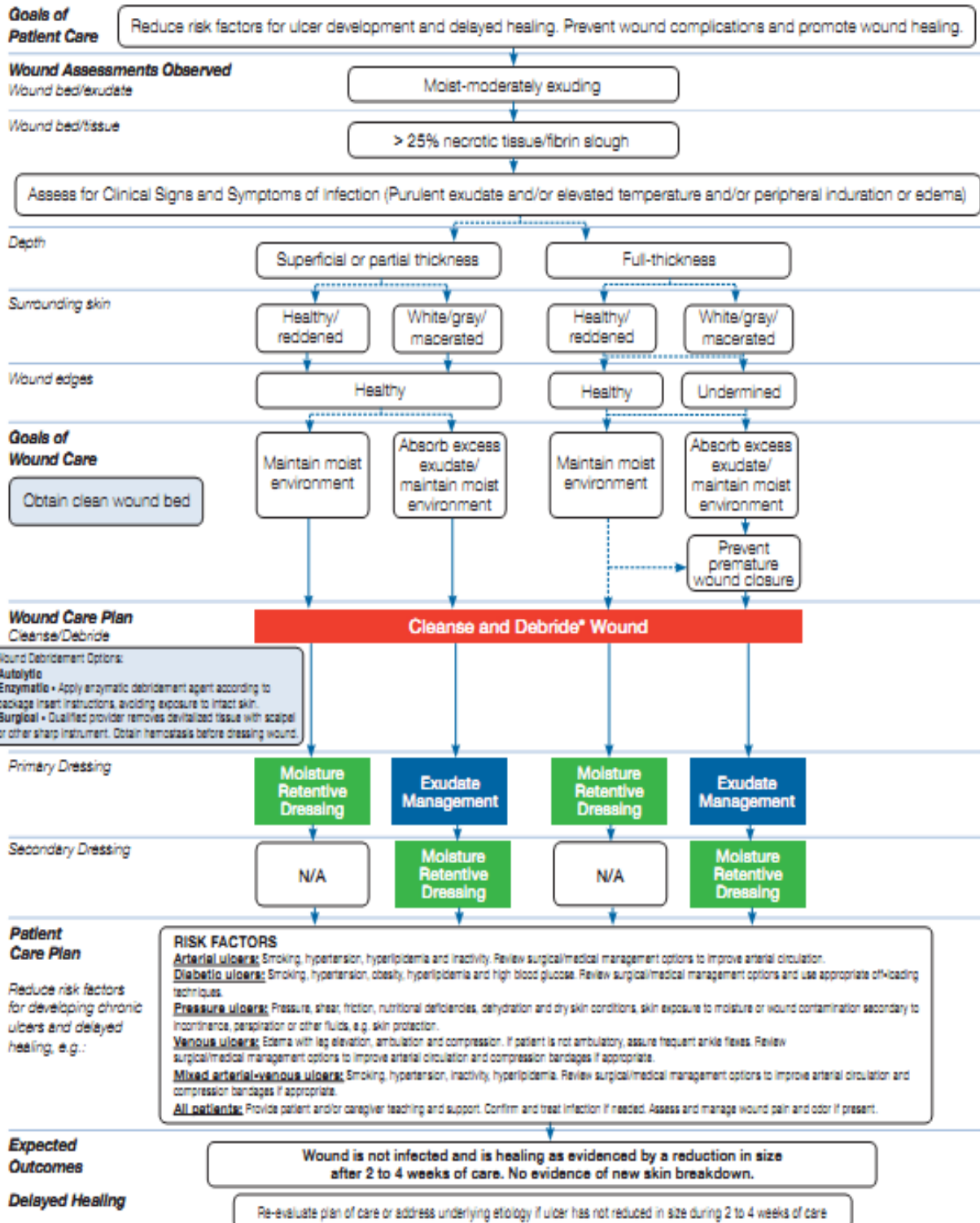
5. Moist, ≤ 25% Necrotic Tissue

Medical Diagnosis: Acute or Chronic Wound Nursing Diagnosis: Skin Integrity Impaired or Tissue Integrity Impaired



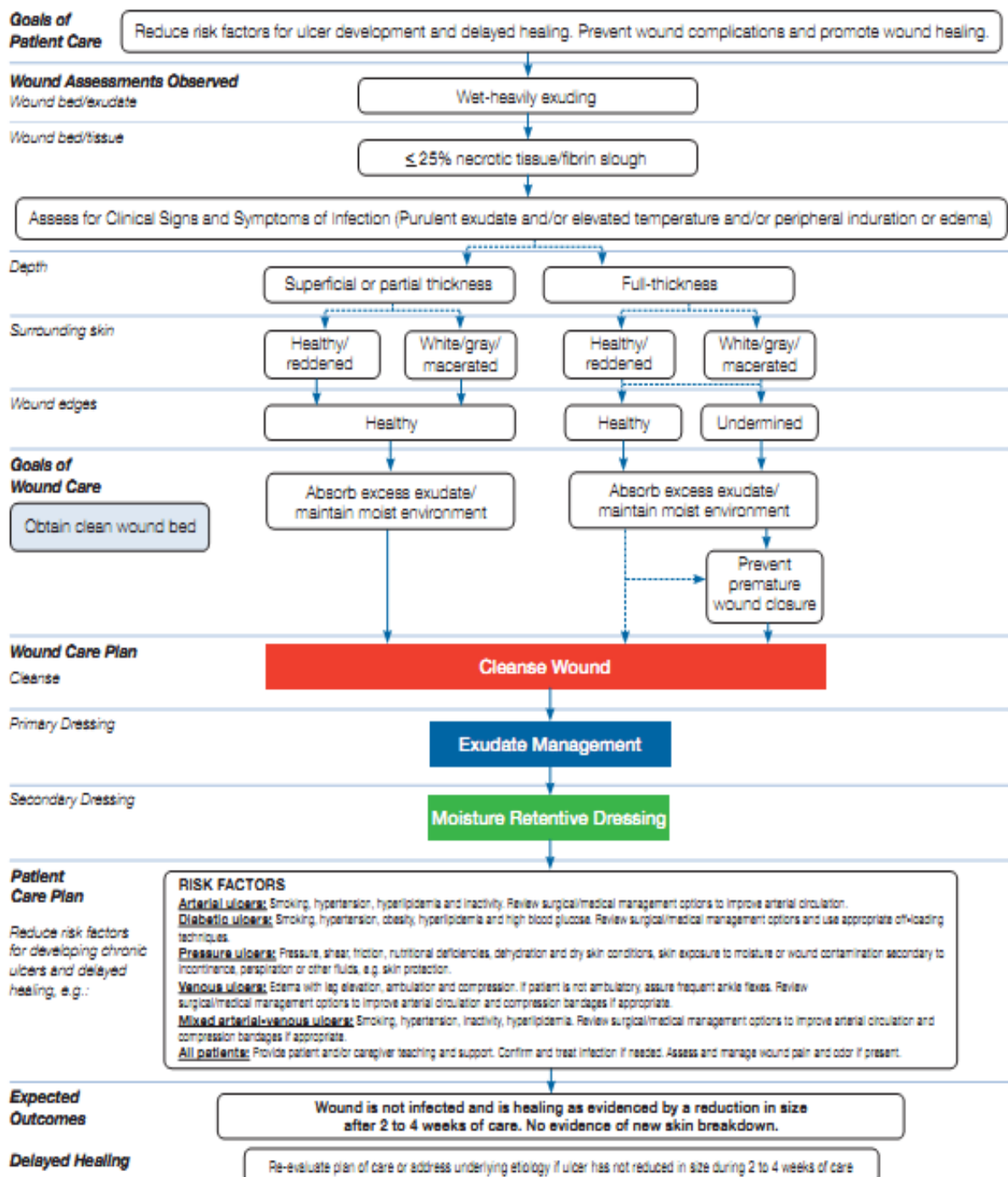
6. Moist, > 25% Necrotic Tissue

Medical Diagnosis: Acute or Chronic Wound Nursing Diagnosis: Skin Integrity Impaired or Tissue Integrity Impaired



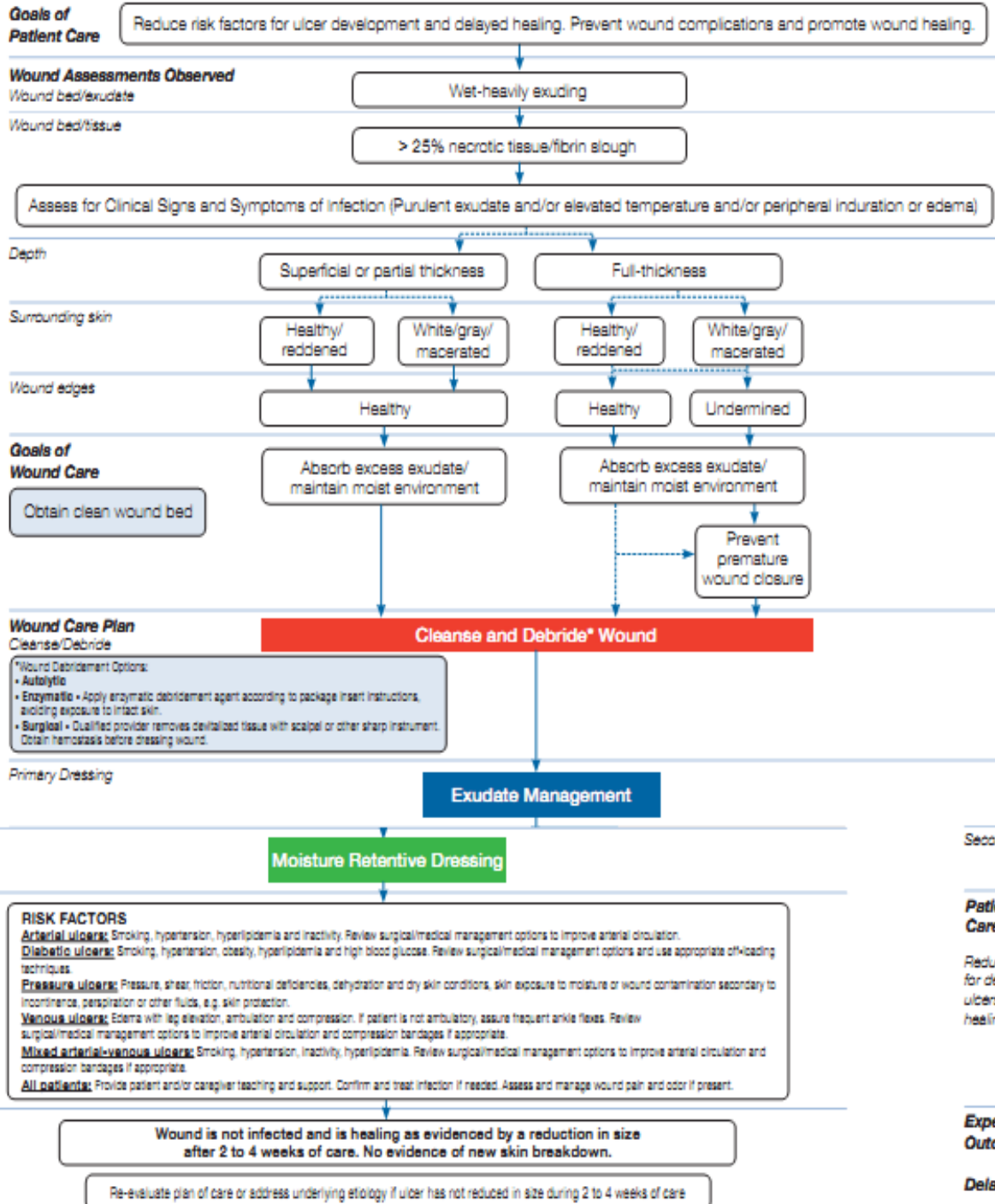
7. Wet, ≤ 25% Necrotic Tissue

Medical Diagnosis: Acute or Chronic Wound Nursing Diagnosis: Skin Integrity Impaired or Tissue Integrity Impaired



8. Wet, > 25% Necrotic Tissue

Medical Diagnosis: Acute or Chronic Wound Nursing Diagnosis: Skin Integrity Impaired or Tissue Integrity Impaired



DESIGNATION OF LEVELS OF EVIDENCE

- I Evidence obtained from at least one properly randomized controlled trial.
- II -1 Evidence obtained from well-designed controlled trials without randomization.
- II-2 Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one centre or group.
- II-3 Evidence from multiple time series with or without intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.
- III Opinion or respected authorities, based on clinical experience, descriptive studies and case reports; or reports of expert committees.

SOURCE: US/CANADIAN PREVENTIVE SERVICES TASK FORCE (HARRIS 2001)