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# Evidence Summary

## Lymphoedema: Objective assessment using perometry

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### Author

Wound Healing and Management Node Group — Emily Haesler

### QUESTION

What is the best available evidence on perometry to assess lymphoedema?

### SUMMARY

Perometry is an advanced method by which lymphoedema can be assessed and is not used commonly in most clinical settings. Although it is a reliable measure of limb size, perometry is unable to distinguish between muscle, bone, fat and fluid<sup>1</sup> (Level 1.b evidence) and is therefore not recommended as the only strategy to measure lymphoedema.

### BACKGROUND

Lymphoedema is a form of chronic oedema in which there is significant, persistent swelling of a limb or other body region due to excess and abnormal accumulation of protein-rich fluid in body tissues<sup>2-5</sup>. This fluid contains a range of inflammatory mediators and adipogenic factors. The lymphatic system is unable to manage the volume of accumulated fluid<sup>5</sup>.

Lymphoedema occurs due to primary, secondary or mixed causes. Primary causes are described as congenital (for example, an inherited disorder such as Milroy's disease), praecox (onset at puberty, for example, Meige's disease) or tarda (sudden onset no apparent cause)<sup>6-8</sup>. Secondary causes arise from direct damage or trauma to the lymphatic system such as injury, parasitic invasion, surgery or radiotherapy<sup>7-9</sup>. The most common cause of secondary lymphoedema is breast cancer treatment<sup>4</sup>. Mixed lymphoedema describes lymphoedema arising from decompensation or failure of the lymphatic system associated with other disease or conditions, including but not limited to obesity, immobility, venous disease or lipoedema<sup>7,8,10</sup>.

Without management, lymphoedema leads to<sup>5,11</sup>:

- progressive swelling,
- superficial changes — increasing adiposity and fibrosis
- physical and functional limitations,
- increased risk of chronic infection,
- lymphorrhoea (leaking of lymph fluid),
- pain and discomfort, and
- reduced ability to undertake activities of daily living (ADLs).

Comprehensive assessment of lymphoedema includes objective measures of volume/size, and subjective assessment of signs and symptoms, including their impact on the patient<sup>12</sup>. In patients with mixed lymphoedema, it is also important to

assess factors associated with the underlying disease or condition (not addressed in this evidence summary).

This evidence summary presents evidence related to the reliability and validity of one objective measurement used to assess lymphoedema: perometry.

A perometer is an infrared measuring device in a measuring frame that calculates arm/extremity volume. The device measures circumference and contour of the limb and calculates a summed volume for the extremity from measurements made of transections at 3mm intervals using a specialised computer program<sup>2</sup>.

### CLINICAL BOTTOM LINE

#### *Performing perometry*

- No standardised positioning of the patient is documented<sup>1</sup>.
- The hand may or may not be included in the measurement; for comparative purposes consistency in one patient's measurements should be maintained<sup>1</sup>.
- For all measures of limb size and/or volume, comparison should be made with<sup>12,13</sup>:
  - › a pre-condition measurement of the affected limb (where available) to determine severity of lymphoedema,
  - › the unaffected limb to determine severity, and
  - › the affected limb over time to objectively assess the effectiveness of the management plan.

#### *Reliability of perometry*

- A systematic review of studies conducted in women following breast cancer treatment reported that perometry has excellent intra-rater reliability (ICC=0.989 to 1.00) and inter-rater reliability (ICC=0.97 to 1.00); has excellent correlation with circumference measurements ( $r=0.877$  to 0.96) and has good correlation with bioimpedance spectroscopy ( $r=0.714$ )<sup>1</sup>. (Level 1.b evidence)

#### *Limitations of perometry*

- The measurement method is unable to distinguish between muscle, bone, fat and fluid<sup>1</sup>.
- Requires specialised equipment and software<sup>1</sup>.
- The device can measure a limb length to a maximum of 40 cm<sup>1</sup>.
- Access is limited in many clinical locations, technique is primarily used in research<sup>2</sup>.

## CHARACTERISTICS OF THE EVIDENCE

This evidence summary is based on a structured literature and database search combining search terms that describe lymphoedema and assessment. The evidence in this summary comes from:

- Systematic reviews of studies of various design<sup>1,3</sup> (Level 1.b evidence)
- Cohort studies with control groups<sup>13</sup> (Level 3.c evidence)
- Observational studies with no control group<sup>9,12</sup> (Level 3.e evidence)
- Case series report<sup>10</sup> (Level 4.c evidence)
- Expert consensus<sup>7</sup> (Level 5.b evidence)
- Expert opinion<sup>2,4-6,8,11</sup> (Level 5.c evidence)

## BEST PRACTICE RECOMMENDATIONS

- Perometry should not be used as the sole objective assessment of lymphoedema. (Grade A).

### Related topics

JB1 Evidence Summary 10912 Identification of people at risk of venous leg ulcers

JB1 11559 Lymphedema: classification

JB1 11564 Lymphedema: objective assessment using bioimpedance spectroscopy

JB1 11562 Lymphedema: objective assessment using perometry

JB1 11870 Lymphedema: objective assessment using tonometry

JB1 11871 Lymphedema: objective assessment using volumetry

JB1 12020 Lymphedema: objective assessment using circumference measurement

JB1 11560 Lymphedema: subjective assessment

JB1 12096 Managing lymphedema: pneumatic compression therapy

## REFERENCES

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