Supplementary Box 1. Full search strategy for Ovid MEDLINE.

((ultrasound.ti,ab. OR ultra sound.ti,ab. OR sonograph*.ti,ab. OR ultrasonic.ti,ab. OR high-frequency.ti,ab. OR high frequency.ti,ab. OR hfus.ti,ab. OR ultrasonog*.ti,ab. OR exp Ultrasonography/)
AND

((skin.ti,ab. OR epiderm*.ti,ab. OR derm*.ti,ab. OR cutaneous.ti,ab OR scar*.ti,ab OR keloid*.ti,ab OR cicatri*.ti,ab OR exp Skin/ OR exp Dermatology/ OR exp Cicatrix/)

AND

(thickness*.ti,ab. OR thicken*.ti,ab. OR depth.ti,ab. OR volume.ti,ab. OR height.ti,ab. OR vancouver scar scale.ti,ab)

ADJ10

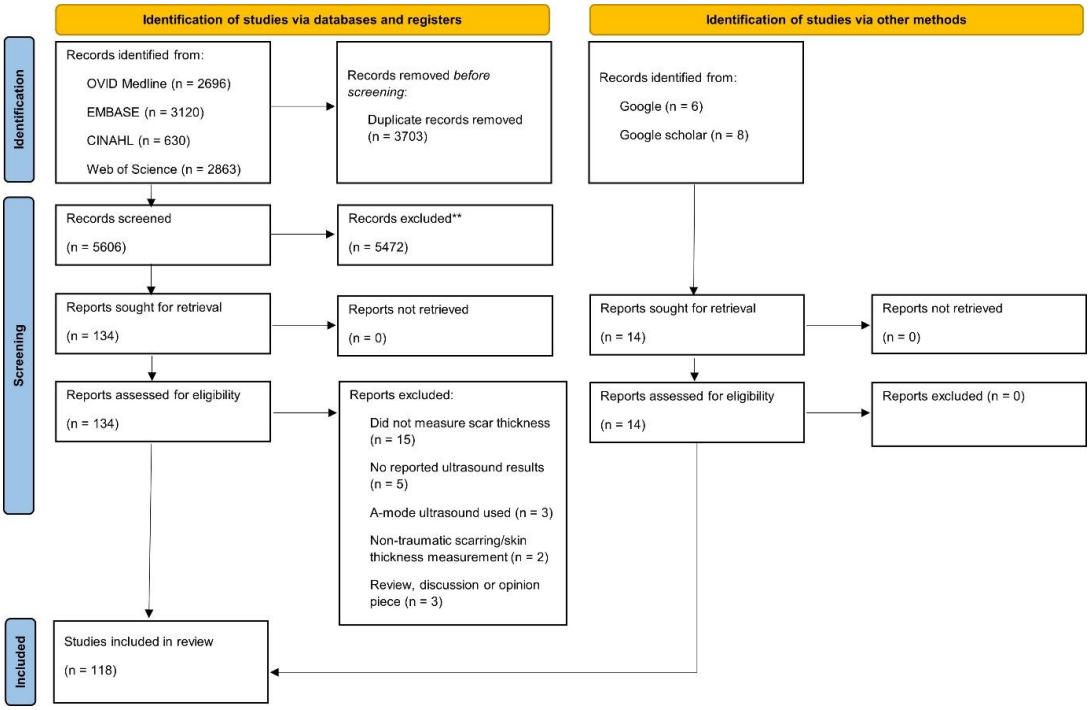
(measure*.ti,ab. OR quantif*.ti,ab. OR calculat*.ti,ab OR estimat*.ti,ab OR assess*.ti,ab. OR determin*.ti,ab. OR evaluat*.ti,ab OR imag*.ti,ab OR exam*.ti,ab)))

NOT (exp animals/ NOT exp humans/)

Legend: ab, abstract (searches the abstract of the publication); adj10, adjacency (search terms must be located within 10 words of one another); exp, explode (used to include all subheadings when searching MeSH headings); ti, title (searches the title of the publication)

BM, MS, TM, TR, BD, RK, ZT – Ultrasound Scoping Review: Supplement

Supplementary Figure 1. Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) flow diagram for this study.



Supplementary Table 1: Extraction categories and fields

Extraction category	Extraction field
Publication details	First author
	Year of publication
	Title of publication
	Country (first author)
	Country (study)
	Country (recruited)
	Publication type (e.g., peer-reviewed journal article, abstract)
	Journal name
	Corresponding author contact details
	Funding source (e.g., commercial, non-commercial)
	Use of scar thickness measurement (e.g., longitudinal study, response to treatment)
Study details	Aim/objective
	Research questions
	Target population/topics
	Study design (e.g., RCT, mixed methods)
	Data and analysis (i.e., statistical methods)
	Removal of scar treatments before ultrasound measurement (e.g., length of time before measurement)
	Reason for measurement (e.g., research, clinical initiative)
	Inclusion/exclusion criteria
	Dates of data collection
	Ultrasound thickness collection methods (e.g., direct collection, collected from medical records)
	Contralateral/unaffected/comparator skin thickness measurement
	Other methods used
	Use of guidelines/frameworks for measurement methods
	How previously published methods/guidelines were used
	Research pipeline stage
	Setting (e.g., inpatient/outpatient clinics)
	Scar type (e.g., burn scar, surgical scar)
Participant details	Number of participants
	Population type (e.g., adult/paediatric)
	Gender ratio
	Patient involvement in thickness determination
	How patients were involved in thickness determination
Ultrasound methods	Ultrasound mode
	Device name and manufacturer
	Frequency used
	Number of measurements taken
	What did researchers report they were measuring (e.g., fibrosis, oedema)
	Anatomical locations/functional measurement units measured
	Patient orientation
	Ultrasound transducer orientation
	Methods used to prevent skin compression
	Measurement site relocation strategies
	Type of skin measurement (i.e., epidermis/dermis/combined)
	Measurer training
Psychometric properties*	Reliability
	Measurement error
Feasibility† outcomes	Time taken for measurement

	Availability of measurement method
	Ease of administration
	Number of steps required
	Number of people required to conduct measurements
	Considerations for special populations
Implementation[‡] outcomes	Acceptability
	Adoption
	Appropriateness
	Cost
	Feasibility
	Fidelity
	Sustainability
Strengths and limitations of measurement methods	Strengths
	Limitations
	Barriers
	Enablers
Findings	Ultrasound-related findings

[*]Psychometric properties as outlined in the COSMIN Risk of Bias tool to assess the quality of studies on reliability or measurement error of outcome measurement instruments[1]
[†]Feasibility outcomes as per Prinsen *et al*.[2]
[‡]Implementation outcomes as per Proctor *et al*.[3]

Supplementary Table 2. Characteristics of records included in this review. Studies are listed alphabetically by author within the translational pipeline phase.

First Author (year)	Country of Publication	Funding Sources	Sample Size (n)	Population Type	Scar Aetiology	Translational Pipeline Phase*
Journal articles						
Agabalyan (2017)	Canada	Non-commercial	10	Adult	Not specified	2
Alsharnoubi (2018)	Egypt	No funding	15	Paediatric	Burn	2
Alsharnoubi (2018)	Egypt	Not reported	15	Paediatric	Burn	2
Alshehari (2015)	Egypt	Not reported	30	Not reported	Mixed	2
Blome-Eberwein (2012)	United States	Non-commercial	16	Paediatric & adult	Burn	2
Blome-Eberwein (2016)	United States	Not reported	36	Adult	Not specified	2
Blome-Eberwein (2019)	United States	Non-commercial	19	Adult	Burn	2
Cai (2019)	China	Non-commercial	51	Adult	Not specified	2
Candy (2010)	Hong Kong	Not reported	17	Adult	Not specified	2
Chan (2004)	China	Non-commercial	56	Paediatric & adult	Burn	2
Chang (2014)	Taiwan	Non-commercial	60	Paediatric & adult	Surgical (cleft lip repair)	2
Cho (2014)	Korea	Non-commercial	146	Not reported	Burn	2
Deng (2019)	China	Not reported	20	Adult	Not specified	2
Deng (2021)	China	No funding	31	Adult	Not specified	2
Deng (2021)	Hong Kong and China	Non-commercial	45	Adult	Not specified	2
Dunkin (2007)	England	Non-commercial	113	Adult	Surgical (dermal scratch)	2
Elrefaie (2020)	Not specified	Not reported	22	Paediatric & adult	Not specified	2
Fabbrocini (2016)	Not specified	Not reported	20	Adult	Mixed	2
Fraccalvieri (2011)	Italy	No funding	5	Adult	Mixed	2
Fraccalvieri (2013)	Italy	Not reported	3	Paediatric & adult	Mixed	2
Gee Kee (2016)	Australia	Commercial	43	Paediatric	Burn	2
Issler-Fisher (2021)	Australia	Commercial	187	Adult	Burn	2
Joo (2020)	Korea	Non-commercial	48	Adult	Not specified	2
Lacarrubba (2008)	Not specified	Not reported	8	Paediatric & adult	Mixed	2

Lau (2005)	Hong Kong	Not reported	100	Paediatric & adult	Burn	2
Lee (2019)	United Kingdom	Non-commercial	55	Adult	Burn	2
Lee (2020)	United Kingdom	Non-commercial	55	Adult	Burn	2
Li (2013)	China	Non-commercial	7	Adult	Burn	2
Li (2020)	China	Not reported	21	Paediatric & adult	Mixed	2
Li (2021)	China	Non-commercial	165	Paediatric	Mixed	2
Li (2021)	China	Non-commercial	105	Adult	Burn	2
Li-Tsang (2006)	Not specified	Non-commercial	45	Adult	Not specified	2
Li-Tsang (2010)	China	Non-commercial	104	Paediatric & adult	Mixed	2
Mamdouh (2021)	Egypt	Not reported	40	Adult	Not specified	2
Meirte (2016)	Belgium	Non-commercial	9	Adult	Burn	2
Miletta (2021)	United States	Non-commercial	29	Paediatric & adult	Burn	2
Nedelec (2019)	Canada	Non-commercial	70	Adult	Burn	2
Nedelec (2020)	Canada	Non-commercial	51	Adult	Burn	2
Nicoletti (2015)	Italy	Not reported	27	Paediatric & adult	Surgical (scar reconstruction)	2
Niessen (1998)	The Netherlands	Commercial & Non-commercial	145	Paediatric & adult	Surgical (breast reduction)	2
Reinholz (2020)	Germany	No funding	25	Adult	Mixed	2
Schwaiger (2018)	Germany	No funding	15	Adult	Mixed	2
van den Kerckhove (2005)	Belgium	Not reported	60	Adult	Burn	2
van der Veer (2010)	The Netherlands	Non-commercial	44	Adult	Surgical (cardiothoracic surgery)	2
Wang (2009)	China	Non-commercial	22	Adult	Burn	2
Wiseman (2020, 2021)	Australia	Commercial & Non-commercial	153	Paediatric	Burn	2
Xuan (2021)	Not specified	Not reported	72	Not reported	Not specified	2
Yim (2010)	Korea	No funding	31	Paediatric & adult	Burn	2
Zadkowski (2016)	Not specified	Not reported	47	Paediatric	Burn	2
Avetikov (2018)	Not specified	Not reported	50	Paediatric & adult	Not specified	3

Chae (2016)	Korea	Non-commercial	23	Adult	Not specified	3
Cheng (2001)	Hong Kong	Not reported	58	Paediatric	Burn	3
Danin (2012)	France	Not reported	22	Paediatric & adult	Burn	3
Fong (1997)	Not specified	Not reported	16	Paediatric & adult	Burn	3
Gankande (2014)	Australia	Non-commercial	30	Adult	Burn	3
Ge (2022)	China	Not reported	21	Paediatric & adult	Mixed	3
Guo (2020)	China	Non-commercial	87	Paediatric & adult	Not specified	3
Huang (2017)	Taiwan	Not reported	1	Adult	Burn	3
Huang (2020)	China	Non-commercial	43	Adult	Not specified	3
Huang (2021)	Taiwan	Not reported	5	Adult	Burn	3
Issler-Fisher (2017)	Australia	No funding	47	Paediatric & adult	Burn	3
Issler-Fisher (2020)	Australia	No funding	78	Adult	Burn	3
Katz (1985)	United States	Not reported	4	Not reported	Burn	3
Kemp Bohan (2021)	United States	No funding	21	Not reported	Burn	3
Kim (2018)	Not specified	Not reported	148	Not reported	Burn	3
Li (2018)	China	Non-commercial	34	Adult	Burn	3
Li-Tsang (2005)	China	Non-commercial	101	Adult	Surgical (orthopaedic surgery)	3
Lobos (2017)	Not specified	Not reported	35	Paediatric & adult	Not specified	3
Nedelec (2008)	Canada	Non-commercial	32	Adult	Burn	3
Nedelec (2014)	Not specified	Non-commercial	46	Adult	Burn	3
Reinholz (2016)	Not specified	Commercial	8	Adult	Not specified	3
Simons (2017)	Australia	Non-commercial	49	Paediatric	Burn	3
Soykan (2014)	The Netherlands	Non-commercial	87	Adult	Surgical (cardiothoracic surgery)	3
Timar-Banu (2011)	Canada	Non-commercial	30	Adult	Mixed	3
Ud-Din (2019)	United Kingdom	Non-commercial	62	Adult	Not specified	3
van den Kerckhove (2003)	Not specified	Not reported	6	Adult	Burn	3

Wang (2010)	Australia	Commercial & Non-commercial	21	Paediatric	Burn	3
Wood (1996)	Not specified	Not reported	1	Paediatric	Burn	3
Yeol Lee (2022)	Korea	Non-commercial	16	Adult	Mixed	3
Berry (1985)	Not specified	Commercial	16	Paediatric & adult	Burn	4
Engrav (2010)	Not specified	Commercial & Non-commercial	67	Paediatric & adult	Burn	4
Abstracts						
Agabalyan (2016)	Not specified	Non-commercial	10	Not reported	Burn	2
Bajouri (2018)	Not specified	Not reported	20	Not reported	Burn	2
Blome-Eberwein (2011, 2012)	Not specified	Not reported	16	Paediatric & adult	Mixed	2
Blome-Eberwein (2014)	Not specified	Not reported	66	Not reported	Burn	2
Cho (2012)	Not specified	Not reported	60	Paediatric & adult	Burn	2
Comstock (2018)	Not specified	Not reported	1	Adult	Burn	2
Cooper (2021)	Not specified	Not reported	25	Not reported	Burn	2
El-Zawhary (2007)	Not specified	Not reported	57	Not reported	Mixed	2
Jacobs (2016)	Not specified	Not reported	6	Paediatric & adult	Burn	2
Jang (2009)	Not specified	Not reported	20	Not reported	Not specified	2
Kim (2009)	Not specified	Not reported	5	Paediatric & adult	Burn	2
Li-Tsang (2010)	Not specified	Not reported	45	Not reported	Not specified	2
Li-Tsang (2011)	Not specified	Not reported	4	Not reported	Not specified	2
Maari (2017)	Not specified	Non-commercial	12	Not reported	Not specified	2
Moortgat (2020)	Not specified	Not reported	10	Not reported	Burn	2
Nedelec (2018)	Not specified	Not reported	60	Not reported	Burn	2
Peters (2018)	Not specified	Not reported	5	Not reported	Burn	2
Siwy (2016)	Not specified	Non-commercial	15	Not reported	Burn	2
Tu (2014)	Not specified	Not reported	59	Not reported	Not specified	2
Ud-Din (2017)	Not specified	Not reported	20	Not reported	Surgical (tissue biopsies)	2
Anthonissen (2015)	Not specified	Not reported	N.R.	Not reported	Burn	3
Bezugly (2014)	Not specified	Not reported	103	Not reported	Mixed	3

Bezugly (2019)	Not specified	Not reported	438	Not reported	Not specified	3
Blome-Eberwein (2012)	Not specified	Not reported	19	Adult	Burn	3
Du (2006)	Not specified	Not reported	1	Adult	Burn	3
Edgear-Lacoursière (2022)	Canada	Not reported	44	Not reported	Burn	3
George (2019)	Not specified	Not reported	11	Not reported	Burn	3
Li (2016)	Not specified	Not reported	34	Not reported	Burn	3
Seo (2011)	Korea	Not reported	48	Not reported	Burn	3
Timina (2013)	Not specified	Not reported	49	Paediatric & adult	Not specified	3
Ud-Din (2017)	Not specified	Not reported	20	Not reported	Surgical (tissue biopsies)	3
Ud-Din (2018)	Not specified	Not reported	62	Not reported	Surgical (tissue biopsies)	3
Zuccaro (2019)	Canada	Not reported	13	Paediatric	Burn	3
Zuccaro (2021)	Not specified	Not reported	20	Paediatric	Burn	3
Zuccaro (2021)	Canada	Non-commercial	20	Paediatric	Burn	3
Cho (2012)	Not specified	Not reported	30	Not reported	Burn	4

Legend: Paediatric: measurement of patients under the age of 18; Adult: measurement of patients aged 18 years or older; N.R.: Not reported; Burn: scars caused by thermal, chemical or friction injury; Surgical: scars caused by surgical procedures (including biopsies); Mixed: participant scars caused by mixed trauma (e.g., burn and acne)

Footnotes: *Stage in the research to clinical practice translational pipeline, based on the Australian Government Department of Health and Aged Care[4]

Supplementary Table 3. Measurement methods used in included records.

First Author (year)	Ultrasound Type	Ultrasound Frequency (MHz)	Measurement Parameters	Scar Characteristic Measured	Scar Relocation
Journal articles					
Agabalyan (2017)	High-frequency	20	Epidermal, dermal & combined	N.R.	Not relevant – single measurement
Alsharnoubi (2018)	Midrange ultrasound	N.R.	N.R.	Fibrosis	N.R.
Alsharnoubi (2018)	Midrange ultrasound	N.R.	N.R.	Fibrosis†	N.R.
Alshehari (2015)	N.R.	N.R.	Maximum elevation above normal skin	N.R.	N.R.
Avetikov (2018)	B-mode	N.R.	Combined epidermal & dermal	N.R.	Not relevant – single measurement
Berry (1985)	N.R.	N.R.	N.R.	N.R.	N.R.‡
Blome-Eberwein (2012)	B-mode	N.R.	Combined epidermal & dermal§	N.R.	N.R.‡
Blome-Eberwein (2016)	High-frequency	50	N.R.	Fibrosis†	N.R.‡
Blome-Eberwein (2019)	High-frequency	35	Dermal	Fibrosis, hair follicle density	N.R.
Cai (2019)	High-frequency	50	Dermal	N.R.	N.R.‡
Candy (2010)	B-mode	N.R.	N.R.	N.R.	Scar boundaries traced
Chae (2016)	N.R.	N.R	Combined epidermal & dermal	N.R.	Not relevant – single measurement
Chang (2014)	N.R.	12	N.R.	N.R.	N.R.

Chan (2004)	N.R.	N.R.	N.R.	N.R.	Tracing
Cheng (2001)	B-mode	5-10	Combined epidermal & dermal	N.R.	Tracing & cutting out paper Photographs
Cho (2014)	High-frequency	7.5	N.R.	N.R.	N.R.
Danin (2012)	B-mode	20	Epidermal & dermal	N.R.	N.R.
Deng (2019)	N.R.	N.R.	N.R.	N.R.	N.R.
Deng (2021)	Colour Doppler	4-15	Dermal	Fibrosis†	N.R.
Deng (2021)	B-mode	8-12	Epidermal & dermal	Fibrosis†	Photographs
Dunkin (2007)	High-frequency	N.R.	N.R.	Fibrosis & oedema†	Measurements taken at set linear distances along scar
Elrefaie (2020)	High-frequency	13	N.R.	Fibrosis & oedema†	N.R‡
Engrav (2010)	N.R.	N.R.	N.R.	N.R.	N.R.
Fabbrocini (2016)	N.R.	N.R.	N.R.	Fibrosis & oedema†	N.R‡
Fong (1997)	B-mode	7.5	N.R.	Fibrosis†	Tracing
Fraccalvieri (2013)	High-frequency	7-10 & 10-13	N.R.	Fibrosis & oedema†	N.R.
Fraccalvieri (2011)	High-frequency	10-13	Combined epidermal & dermal	Fibrosis†	N.R.
Gankande (2014)	High-frequency	20	Combined epidermal & dermal	N.R.	Scar marked & photographed
Ge (2022)	N.R.	N.R.	N.R.	N.R.	N.R.
Gee Kee (2016)	B-mode	8-18	Combined epidermal & dermal	N.R.	Transducer in centre of original burn site where no scar present
Guo (2020)	N.R.	2-15 & 4-15	Combined epidermal & dermal[c]	Fibrosis†	Thickest site on peripheral regions
Huang (2017)	N.R.	N.R.	Combined epidermal & dermal	N.R.	Marked & linear measurements from bony landmarks

Huang (2021)	B-mode	5-12	N.R.	Oedema†	Not relevant – single measurement
Huang (2020)	B-mode	5-12	Combined epidermal & dermal	N.R.	N.R.
Issler-Fisher (2021)	N.R.	N.R.	N.R.	N.R.	Photograph & measurement of thickest area
Issler-Fisher (2020)	N.R.	N.R.	N.R.	N.R.	N.R.
Issler-Fisher (2017)	N.R.	N.R.	N.R.	Fibrosis†	Scar mapped with drawing Thickest area measured
Joo (2020)	N.R.	N.R.	N.R.	Fibrosis†	N.R.
Katz (1985)	B-mode	10	Combined epidermal & dermal	N.R.	N.R.
Kemp Bohan (2021)	High-frequency	12	N.R.	Fibrosis†	Tracing – thickest area & adjacent landmarks marked
Kim (2018)	N.R.	22	Combined epidermal & dermal	N.R.	Not relevant – single measurement
Lacarrubba (2008)	B-mode	20	Combined epidermal & dermal	N.R.	N.R.
Lau (2005)	Tissue Ultrasound Palpation System	5 (burn) & 10 (surgical)	N.R.	N.R.	Tracing – most severe/prominent site
Lee (2020)	High-frequency	20	Combined epidermal & dermal	Fibrosis†	Not relevant – single measurement
Lee (2019)	High-frequency	20	Combined epidermal & dermal	Fibrosis†	Marked with pen
Li (2013)	High-frequency	12	Combined epidermal & dermal	Fibrosis†	Tracing
Li (2020)	N.R.	10	N.R.	Fibrosis†	N.R.
Li (2021)	High-frequency	20	N.R.	N.R.	Thickest area
Li (2021)	High-frequency	20	N.R.§	Fibrosis†	Thickest area
Li (2018)	N.R.	N.R.	Combined epidermal & dermal	N.R.	N.R.
Li-Tsang (2005)	Tissue Ultrasound Palpation System	N.R.	N.R.	N.R.	N.R.
Li-Tsang (2006)	B-mode	N.R.	N.R.	N.R.	N.R‡

Li-Tsang (2010)	B-mode	N.R.	N.R.	Fibrosis†	N.R.
Lobos (2017)	B-mode & colour Doppler	18	N.R.	Fibrosis†	Not relevant – single measurement
Mamdouh (2021)	High-frequency	N.R.	Combined epidermal & dermal§	Fibrosis†	N.R.
Meirte (2016)	High-frequency	22	Dermal	Fibrosis & oedema†	Marked with surgical pen, including boundaries of probe. Photograph of body position & probe location
Miletta (2021)	N.R.	50	N.R.	Fibrosis†	Tracing – worst scar
Nedelec (2014)	High-frequency	20	Combined epidermal & dermal	N.R.	Tracing including notable landmarks. Measurement site circled. Photograph
Nedelec (2008)	High-frequency	20	Combined epidermal & dermal	N.R.	Tracing including notable landmarks. Measurement site circled. Photograph
Nedelec (2019)	High-frequency	20	Combined epidermal & dermal	Fibrosis & oedema†	Tracing. Hole cut over measurement area
Nedelec (2020)	High-frequency	20	Combined epidermal & dermal	N.R.	Photograph
Nicoletti (2015)	N.R.	22	Epidermis to fascia	N.R.	N.R.
Niessen (1998)	B-mode	N.R.	N.R.	Fibrosis & oedema†	3cm border marked with tape – measurements lateral
Reinholz (2020)	B-mode	11	Combined epidermal & dermal	Fibrosis & oedema†	N.R.
Reinholz (2016)	B-mode	11	Combined epidermal & dermal§	Fibrosis & oedema†	N.R.
Schwaiger (2018)	B-mode	11	N.R.	Fibrosis & oedema†	N.R.
Simons (2017)	B-mode	8-18	Combined epidermal & dermal	N.R.	Tracing – scar & anatomical landmarks

Soykan (2014)	N.R.	3-9	N.R.	Fibrosis†	N.R.
Timar-Banu (2001)	High-frequency	20	Combined epidermal & dermal	Fibrosis†	N.R.
Ud-Din (2019)	High-frequency	50	Combined epidermal & dermal	Fibrosis	Defined anatomical location
van den Kerckhove (2003)	High-frequency	20	Combined epidermal & dermal	N.R.	Test sites marked. Thermoplastic splints created with space for transducer
van den Kerckhove (2005)	High-frequency	20	Combined epidermal & dermal	N.R.	Test site boundaries marked & traced
van der Veer (2010)	N.R.	7.5	N.R.	Fibrosis†	Standardised linear measurement points
Wang (2009)	High-frequency	N.R.	N.R.	Fibrosis†	N.R.
Wang (2010)	B-mode	N.R.	Combined epidermal & dermal	N.R.	Tracing – scar & anatomical landmarks
Wiseman (2020, 2021)	B-mode	N.R.	Combined epidermal & dermal	Fibrosis†	Centrally site of interest
Wood (1996)	B-mode	7 & 10	N.R.	N.R.	Transducer affixed to tracking arm
Xuan (2021)	High-frequency	20	N.R.	Fibrosis†	N.R.
Yeol Lee (2022)	B-mode	7-16	N.R.	N.R.	N.R.
Yim (2010)	High-frequency	12	N.R.	N.R.	N.R.
Zadkowski (2016)	B-mode	N.R.	Combined epidermal & dermal	N.R.	N.R.
Abstracts					
Agabalyan (2016)	N.R.	20	Epidermal, dermal & combined	N.R.	N.R.
Anthonissen (2015)	N.R.	22	Epidermal & dermal	N.R.	N.R.
Bajouri (2018)	High-frequency	N.R.	Epidermal & dermal	N.R.	N.R.

Bezugly (2019)	High-frequency	22, 33 & 75	Epidermal & dermal	N.R.	N.R.
Bezugly (2014)	High-frequency	33 & 75	Epidermal & dermal	N.R.	N.R.
Blome-Eberwein (2011, 2012)	N.R.	N.R.	N.R.	N.R.	N.R.
Blome-Eberwein (2012)	High-frequency	N.R.	N.R.	Fibrosis	N.R.
Blome-Eberwein (2014)	High-frequency	N.R.	N.R.	N.R.	N.R.
Cho (2012)	N.R.	N.R.	N.R.	N.R.	N.R.
Cho (2012)	N.R.	N.R.	N.R.	N.R.	N.R.
Comstock (2018)	N.R.	N.R.	N.R.	N.R.	N.R.
Cooper (2021)	N.R.	N.R.	N.R.	N.R.	N.R.
Du (2006)	B-mode	15	N.R.	N.R.	N.R.
Edgar-Lacoursière (2022)	N.R.	N.R.	N.R.	N.R.	N.R.
El-Zawhary (2007)	N.R.	N.R.	N.R.	N.R.	N.R.
George (2019)	N.R.	N.R.	N.R.	N.R.	N.R.
Jacobs (2016)	N.R.	N.R.	N.R.	N.R.	N.R.
Jang (2009)	N.R.	N.R.	N.R.	N.R.	N.R.
Kim (2009)	N.R.	N.R.	N.R.	N.R.	N.R.
Li (2016)	N.R.	N.R.	N.R.	N.R.	N.R.
Li-Tsang (2011)	Tissue Ultrasound Palpation System	N.R.	N.R.	N.R.	N.R.
Li-Tsang (2010)	Tissue Ultrasound Palpation System	N.R.	N.R.	N.R.	N.R.
Maari (2017)	N.R.	N.R.	N.R.	N.R.	N.R.

Moortgat (2020)	High-frequency	N.R.	Dermal	N.R.	N.R.
Nedelec (2018)	N.R.	N.R.	N.R.	N.R.	N.R.
Peters (2018)	High-frequency	22	N.R.	N.R.	N.R.
Seo (2011)	N.R.	7.5	N.R.	N.R.	Thickest point
Siwy (2016)	N.R.	N.R.	N.R.	N.R.	N.R.
Timina (2013)	N.R.	20-40	N.R.	N.R.	N.R.
Tu (2014)	High-frequency ultrasound biomicroscopy	N.R.	N.R.	N.R.	N.R.
Ud-Din (2017)	N.R.	N.R.	N.R.	N.R.	N.R.
Ud-Din (2017)	High-frequency	50	N.R.	N.R.	N.R.
Ud-Din (2018)	High-frequency	N.R.	N.R.	Fibrosis†	N.R.
Zuccaro (2021)	N.R.	N.R.	N.R.	N.R.	N.R.
Zuccaro (2019)	B-mode	N.R.	N.R.	N.R.	N.R.
Zuccaro (2021)	B-mode	6-18	Combined epidermal & dermal	N.R.	Scar outlined & photographed

Legend: Scar relocation: Methods used by assessors to relocate the measured scar for sequential measurements; B-mode: brightness-mode ultrasound (< 20 MHz); High-frequency: high-frequency B-mode ultrasound (> 20 MHz); N.R.: Not reported
Footnotes: †Indirect reference made in record (e.g. in introduction or discussion); ‡Photographs taken of the scar but not specified whether used for relocation; §Not stated in methods, so images provided in record used by authors of this review to provide subjective judgement

Supplementary Table 4. Additional measurement methods used alongside ultrasound in included studies

First author (year)	Objective measurement methods	Clinician-based rating scale	PROM
Journal articles			
Agabalyan (2017)	Histology	-	-
Alsharnoubi (2018)	Laser Doppler perfusion	VSS	-
Alsharnoubi (2018)	Laser Doppler perfusion	VSS	-
Alshehari (2015)	-	VSS	-
Avetikov (2018)	-	-	-
Berry (1985)	Transcutaneous oxygen measurement	Scar redness and hypertrophy rating scale (0-5 Likert scale)	Scar redness and hypertrophy rating scale (0-5 Likert scale)
Blome-Eberwein (2012)	Doppler flowmeter – vascularity Cutometer – pliability Semmes-Weinstein monofilament Aesthesiometer testing set – sensation	VSS POSAS-O	POSAS-P
Blome-Eberwein (2016)	Cutometer – pliability Dermaspectrometer – colour Semmes-Weinstein Aesthesiometer Monofilament Testing Set – sensation	VSS POSAS-O	POSAS-P
Blome-Eberwein (2019)	-	VSS	-
Cai (2019)	-	Clinical evaluation	-
Candy (2010)	Spectrocolorimeter – colour	VSS	-
Chae (2016)	Spectrophotometer – pigmentation	VSS POSAS-O	POSAS-P
Chang (2014)	-	VSS Photographic evaluation (0-10 VAS)	-
Chan (2004)	Cutometer – viscoelasticity Spectrophotometer – pigmentation	-	-
Cheng (2001)	-	VSS	-
Cho (2014)	Mexameter – colour	Treatment efficacy (0-10 VAS)	Itching scale (0-4 Likert scale)

	Tewameter – trans-epidermal water loss Sebumeter – sebum Cutometer – elasticity		
Danin (2012)	Cutometer – elasticity	VSS	-
Deng (2019)	DermaLab Combo – colour Dermoscopy – vascularity	POSAS-O	-
Deng (2021)	-	VSS	-
Deng (2021)	Doppler – blood perfusion Dermlite Foto IIPro – erythema	POSAS-O	POSAS-P
Dunkin (2007)	-	-	-
Elrefaie (2020)	Ultrasound – echogenicity, compressibility & vascularity	VSS	-
Engrav (2010)	Durometer – hardness Chromameter – colour	Clinical appearance based on photographs	-
Fabbrocini (2016)	-	mVSS (vascularity, pigmentation, pliability)	-
Fong (1997)	Cutometer – elasticity	Clinical rating – colour change, consistent itch, hypersensitivity, blistering	-
Fraccalvieri (2013)	Colour power Doppler – vascularisation	VSS Visual analogue scale – pain and itch	
Fraccalvieri (2011)	Histology Echocontrastography – neovascularisation	-	-
Gankande (2014)	DermLab combo – erythema & elasticity	mVSS (some participants)	-
Ge (2022)	-	POSAS-O Subjective reports on patient range of movement	POSAS-P
Gee Kee (2016)	3D photography – thickness	POSAS-O	POSAS-P
Guo (2020)	Ultrasound – blood flow grade Shear wave elastography – scar stiffness	-	-

Huang (2017)	-	-	-
Huang (2021)	-	-	-
Huang (2020)	Shear wave elastography – scar stiffness	-	-
Issler-Fisher (2021)	-	VSS POSAS-O	POSAS-P
Issler-Fisher (2020)	-	VSS POSAS-O	POSAS-P Patient pain & itch scales
Issler-Fisher (2017)	-	VSS POSAS-O	POSAS-P Patient pain, itch & quality of life rating scales
Joo (2020)	-	VSS	Pain severity (0-10 VAS)
Katz (1985)	Cicatrometer – firmness	-	-
Kemp Bohan (2021)	-	-	-
Kim (2018)	-	-	-
Lacarrubba (2008)	-	Clinical evaluation of lesion size	-
Lau (2005)	-	VSS	-
Lee (2020)	-	mVSS (height, pliability, vascularity, pigmentation) POSAS-O	POSAS-P
Lee (2019)	-	mVSS (height, pliability, vascularity, pigmentation) POSAS-O	POSAS-P
Li (2013)	Micrometer – tissue thickness Force/torque sensor – load applied to scar	-	-
Li (2020)	Cutometer – elasticity Mexameter – colour PeriCam PSI system and mexameter – blood supply	VSS	Quality of life questionnaire
Li (2021)	Laser Doppler flowmetry – perfusion	VSS	-
Li (2018)	Spectrocolourimeter – scar colour	VSS	Pain & itch (0-10 VAS)
Li (2021)	-	VSS	Treatment satisfaction
Li-Tsang (2005)	Spectrocolourimeter – scar colour	VSS	Pain & itch (VAS scale not specified)
Li-Tsang (2006)	Spectrocolorimeter – colour	VSS	Pain & itch (VAS)

Li-Tsang (2010)	Spectrocolorimeter – colour	VSS (pliability)	Pain & itch (10-point VAS)
Lobos (2017)	-	Modified Seattle Scar Scale Clinical opinion	-
Mamdouh (2021)	-	VSS	Patient satisfaction (VAS)
Meirte (2016)	-	-	-
Miletta (2021)	Colourmeter – scar colour Dermal torque meter – scar compliance	Unclear, likely POSAS-O	Unclear, likely POSAS-P Short Form 36 Quality of Life Survey
Nedelec (2014)	Cutometer – elasticity Mexameter – colour	-	-
Nedelec (2008)	Cutometer – elasticity Mexameter – colour	mVSS	-
Nedelec (2019)	Cutometer – elasticity Mexameter – colour	-	-
Nedelec (2020)	Cutometer – elasticity Mexameter – colour	-	Pain & itch (10cm line VAS)
Nicoletti (2015)	-	-	-
Niessen (1998)	Histology	-	-
Reinholz (2020)	3D topographic imaging device	POSAS-O	Dermatology Quality of Life Index POSAS-P
Reinholz (2016)	Optical coherence tomography – thickness	POSAS-O	Dermatology Quality of Life Index POSAS-P
Schwaiger (2018)	3D topographic imaging device	-	-
Simons (2017)	3D camera – scar height	POSAS-O	-
Soykan (2014)	Slide calliper – dimensions	POSAS-O	POSAS-P
Timar-Banu (2001)	Metric ruler – dimensions	Validated 3-point scoring system for redness, hardness, itching & pain	-
Ud-Din (2019)	Optical coherence tomography – thickness Histology	-	-
van den Kerckhove (2005)	Chromameter – erythema	-	-
van der Veer (2010)	Slide calliper – dimensions	-	-
Wang (2009)	Histology	-	-
Wang (2010)	-	-	-

Wiseman (2020, 2021)	-	POSAS-O	POSAS-P Numeric rating scale for itch Toronto Paediatric Itch Scale CH-9D BBSIP
Wood (1996)	-	VSS	-
Xuan (2021)	Histology	-	-
Yeol Lee (2022)	Cutometer – elasticity Elastography	mVSS	-
Yim (2010)	Cutometer – elasticity Tewameter – trans-epidermal water loss Mexameter – colour	-	-
Zadkowski (2016)	-	VSS	-
Abstracts			
Agabalyan (2016)	Histology	-	-
Bajouri (2018)	-	VSS	-
Bezugly (2019)	Clinical or histopathological diagnosis	-	-
Bezugly (2014)	-	-	-
Blome-Eberwein (2011, 2012)	Doppler vascularity, elasticity and sensation	VSS	Pain and itching scale (0-10 Likert scale)
Blome-Eberwein (2012)	-	-	-
Blome-Eberwein (2014)	Doppler flowmeter – vascularity Cutometer – pliability Semmes-Weinstein monofilament aesthesiometer testing set – sensation	VSS	POSAS-P
Cho (2012)	-	VSS	-
Cho (2012)	CK-MPA Multi-Probe adaptor – pigmentation, erythema and trans-epidermal water loss Cutometer – elasticity	-	-
Comstock (2018)	Computer-based tools – Thickness & pliability	Unclear, likely POSAS-O	Unclear, likely POSAS-P

Cooper (2021)	Colorimeter – pigmentation	Unclear, likely POSAS-O	Unclear, likely POSAS-P
Du (2006)	-	-	-
Edgar-Lacoursière (2022)	Cutometer – elasticity Mexameter – colour	-	-
El-Zawhary (2007)	Histology	-	-
George (2019)	-	-	-
Jacobs (2016)	Cutometer – pliability Colorimeter – colour	POSAS-O	-
Jang (2009)	Mexameter – pigmentation Tewameter – trans-epidermal water loss Sebumeter – sebum Cutometer – elasticity Laser Doppler – perfusion	-	-
Kim (2009)	Histology	VSS	-
Li (2016)	Spectrocolourimeter – scar colour	VSS	Patient report of pain & itch
Li-Tsang (2011)	-	VSS (thickness, pliability and pigmentation)	-
Li-Tsang (2010)	Histology Spectrocolourimeter – scar colour	VSS	Self-report questionnaire
Maari (2017)	Cutometer – elasticity Mexameter – pigmentation	-	-
Moortgat (2020)	Cutometer – elasticity Chromameter – colour Tewameter – trans-epidermal water loss Corneometer – hydration	Unclear, likely POSAS-O	Unclear, likely POSAS-P
Nedelec (2018)	Cutometer – elasticity Mexameter – colour	-	-
Peters (2018)	Cutometer – elasticity Colourimeter – colour	POSAS-O	POSAS-P
Seo 2011	Cutometer – elasticity		
Siwy (2016)	Colourimeter – colour Torque meter – pliability & elasticity	-	SF-36 Quality of Life Measurement POSAS-P
Timina (2013)	-	-	-

Tu (2014)	-	VSS	-
Ud-Din (2017)	Laser perfusion imaging Optical coherence tomography – thickness Histology	-	-
Ud-Din (2017)	Optical coherence tomography – thickness	-	-
Ud-Din (2018)	Optical coherence tomography – thickness Histology	-	-
Zuccaro (2021)	Multi-parameter skin analysis device	VSS Unclear, likely POSAS-O	Unclear, likely POSAS-P
Zuccaro (2019)	Acoustic radiation force impulse ultrasound elastography	-	-
Zuccaro (2021)	Acoustic radiation force impulse – stiffness DermLab Combo elasticity probe – elasticity DermLab Combo colour probe – colour	VSS POSAS-O (did not include surface area and relief subscales)	POSAS-P

Legend: (m)VSS: (Modified) Vancouver Scar Scale; POSAS: Patient and Observer Scar Assessment Scale (POSAS-O: POSAS observer scale; POSAS-P: POSAS patient scale); VAS: Visual Analogue Scale; CHU-9D: Child Health Utility-9D; BBSIP: Brisbane Burn Scar Impact Profile

Supplementary Table 5: Reliability of ultrasound methods reported in each included study

First Author (year)	Reliability Test & Measurement Error	Reliability & Measurement Error Test Statistics & Details
Inter-rater reliability		
Anthonissen (2015)	ICC; SEM	Epidermal – 0.297; 0.02mm Dermal – 0.991; 0.13mm
Chang (2014)	Pearson correlation	R=0.90, p<0.001
Dunkin (2007)	N.R.	N.R.
Fong (1997)	ICC	0.93, p=0.146
Gankande (2014)	ICC (95% CI)	Individual site: **Rater 1 vs rater 2** 'Best scar' – 0.95 (0.92, 0.96) 'Worst scar' – 0.95 (0.91, 0.97) 'Normal skin' – 0.94 (0.91, 0.96) **Rater 1 vs rater 3:** 'Best scar' – 0.86 (0.78, 0.91) 'Worst scar' – 0.91 (0.85, 0.95) 'Normal skin' – 0.92 (0.88, 0.95) **Rater 2 vs rater 3:** 'Best scar' – 0.93 (0.89, 0.95) 'Worst scar' – 0.96 (0.92, 0.97) 'Normal skin' – 0.95 (0.92, 0.97) Average site: **Rater 1 vs rater 2** 'Best scar' – 0.97 (0.94, 0.99) 'Worst scar' – 0.98 (0.96, 0.99) 'Normal skin' – 0.97 (0.93, 0.98) **Rater 1 vs rater 3** 'Best scar' – 0.90 (0.77, 0.95) 'Worst scar' – 0.97 (0.91, 0.98) 'Normal skin' – 0.96 (0.92, 0.98) **Rater 2 vs rater 2** 'Best scar' – 0.95 (0.88, 0.98) 'Worst scar' – 0.98 (0.94, 0.99) 'Normal skin' – 0.98 (0.97, 0.99)
Lau (2005)	ICC	0.84, p<0.01
Lee (2020)	ICC	"Acceptable to high"
Lee (2019)	ICC (95% CI); SEM	Scar: Single: 0.957 (0.934-0.973) Average: 0.985 (0.977-0.991) SEM: 0.10 mm Unscarred skin: Single: 0.967 (0.949-0.980) Average: 0.989 (0.982-0.993) SEM: 0.04 mm
Nedelec (2008)	ICC (95% CI)	Most severe scar: 0.90 (0.84-0.95) Less severe scar: 0.91 (0.85-0.95) Donor site: 0.89 (0.82-0.94) Normal skin: 0.85 (0.75-0.92)
Seo (2011)	N.R.	"High"
Simons (2017)	ICC (95% CI); SEM	Scar: 0.82 (0.7-0.89); 0.05 cm Normal skin: 0.33 (0.08-0.54); 0.03 cm
Van Den Kerckhove (2003)	ICC (95% CI); SEM	One day: 0.88 (0.81-0.95); 0.29 mm

		Day-to-day: 0.94 (0.90-0.98); 0.21mm
Intra-rater reliability		
Anthonissen (2015)	ICC; SEM	Epidermal – 0.809; 0.01mm Dermal – 0.991; 0.13mm
Gankande (2014)	ICC (95% CI)	'Best scar' – 0.97 (0.89, 0.94) 'Worst scar' – 0.92 (0.88, 0.95) 'Normal skin' – 0.86 (0.81, 0.89)
Gee Kee (2016)	N.R.	N.R.
Lau (2005)	ICC	Intra-rater: 0.98, p<0.01
Lee (2019)	ICC (95% CI)	Scar: Single: 0.951 (0.871-0.987) Average: 0.983 (0.953-0.966) SEM: 0.10 mm Unscarred skin: Single: 0.948 (0.881-0.976) Average: 0.982 (0.954-0.993) SEM: 0.04 mm
Li (2013)	ICC	0.89
Seo (2011)	N.R.	"High"
Simons (2017)	ICC (95% CI); SEM	Scar: 0.95 (0.91-0.97); 0.02 cm Normal skin: 0.61 (0.41-0.75); 0.02 cm
Van Den Kerckhove (2003)	ICC (95% CI); SEM	0.98 (0.97-0.99); 0.11mm
Wang (2010)	SE	Peak: 0.032 3 months: 0.018 6 months: 0.399 9 months: 0.353

Abbreviations used in tables: N.R.: Not reported; ICC: Intraclass Correlation Coefficient; 95% CI: 95% Confidence Interval; SEM: Standard Error of Measurement; SE: Standard Error

Summary of findings for measurement error:

The reported inter-rater SEM measurements for the combined (i.e., epidermal and dermal) thickness measurement of scars was reported in two records as 0.11 mm[5] and 0.5 mm.[6] The inter-rater SEM for the combined thickness measurement of unscarred skin was also calculated in one record (SEM = 0.3 mm).[6] The inter-rater SEM was calculated in one record for the measurement of epidermal (SEM = 0.02 mm) and dermal (0.13) measurements[7], and one record reported only the dermal SEM for scar thickness (SEM = 0.1 mm) and unscarred skin (0.04 mm).[8] The intra-rater SEM for the combined thickness measurement of scarred skin ranged from 0.18 mm to 0.52 mm, and was measured at 0.2 mm for unscarred skin in one record.[6] One record reported the intra-rater SEM for epidermal (0.01 mm) and dermal (0.12 mm),[7] and one record reported the intra-rater SEM for dermal scar (0.1 mm) and unscarred skin (0.04).[8]

Supplementary Table 6. Methodological considerations for researchers and/or clinicians undertaking measurement of scar thickness using ultrasound.

Consideration	Details & examples of considerations	Publications in our review addressing the consideration	Details reported in included review records
Preventing skin compression during measurement	Using standoff methods (e.g., ultrasound gel, water bath) to prevent transducer touching the skin	[6,9-13]	- Use of ultrasound gel to prevent contact between ultrasound transducer and skin surface to minimise compression applied by direct application of transducer [6,9-12] - Silicone pad placed underneath transducer [13]
	Application of minimal pressure by transducer	[14-18]	- Transducer held to maintain minimal pressure on scar [14,15,17] - Training users to apply minimal force on transducer to prevent scar or skin distortion [16,18]
	Deliberately compressing skin to quantify scar compressibility	[19-21]	- Measurement of thickness with and without compression with transducer [19,21] - Thickness measurements taken using TUPS, which uses controlled and metered compression during measurement [20]
Orienting the patient	Orienting the patient during measurement (e.g., upright, supine, prone or seated)	[8,18,22]	- Patient supine throughout measurement to allow measurement to be taken in the same position [8,18,22]
	Maintaining patient stillness during measurement	[9]	- Patients asked to hold breath during measurement of scars on the chest to allow shear-wave ultrasound [9]
Placing ultrasound transducer	Orientating ultrasound transducer [e.g., vertical (superior to inferior/cranial to caudal), horizonal (medial to lateral)]	[23]	- Direction of transducer recorded to ensure consistency [23]

	Orienting the transducer in relation to the scar (e.g., perpendicular)	9,15,17,18,22,24-26	- Transducer oriented perpendicular to the skin surface to provide optimal image [9,15,18,22,24-26]
	Measuring difficult/tight areas (e.g., axillae or other joints)	6	- Exclusion of fingers and toes in paediatric measurements due to size of measurement area and thin skin [6]
Relocating scars for longitudinal measurement	Mapping measurement area (e.g., tracing, schematic diagram)	6,12,16,18,20,22,27-32	- Scars traced using translucent paper [18,20,22,27,29,31,32] - Scars and surrounding anatomical landmarks traced using translucent paper [16] - Scar mapped on transparent paper, which was then cut out [28] - Scar mapped with drawing, no elaboration provided [30] - Scars traced using Visitrak (Smith & Nephew Medical Limited, England) [6,12]
	Photographing measurement area	24,26,33	- Assessed area marked and photograph taken in initial consultation [24,33] - Photographs of scars taken [26]
	Measuring specific scar locations (e.g., centre of scar, worst area of scar, counting transducer lengths)	6,8,9,13,19-21,23,30,33-37	- Measurement taken at standardised transducer lengths along surgically created scars of pre-specified dimensions [34] - Measurements taken at thickest/most severe point [19-21,30,33,35,37], as determined by the patient and/or clinician [8] - Transducer placed on thickest site on peripheral regions [9] - Transducer placed on area initially identified to have greatest burn depth [23]

	Conducting linear measurements from nearby anatomical landmarks	[17,38]	- Measurement area selected by the measurer with -selected area marked with tape [13] - Measurements taken at set linear distances from cranial/caudal border of linear sternal scar [36] - Linear measurements from anatomical landmark to measurement site [17] - Transducer placement mapped in 3-dimensional space using a surgical precision tracking arm [38]
Acclimatising scar to measurement conditions	Removing scar treatments prior to ultrasound measurement	[8,12,20,22,24-26,28,29,39,40]	- Pressure garments removed 10 minutes before measurement [28] - Pressure garments removed 15 minutes before measurement to regain original (uncompressed) scar thickness or to reduce blanching effects on measurement [20,40] - Pressure garments/gels/moisturisers removed 20 minutes before measurement [8,22,29] - Pressure garments removed 30 minutes before measurement [12,25,26,39] - Sequential measurement of scars following direct treatment with vacuum massage at 5, 30, 60 and 120 minutes to monitor effect of treatment [24]
	Acclimatising patient to room prior to measurement	[5,18,22,29,41-46]	- Patients rested for minimum 5 minutes before measurement [5,18,22] - Scar exposed to room conditions for 10 minutes [29] to allow equilibrium to be reached with surrounding environment [41] - Patients resting in room with constant temperature for 15 mins [42] to allow scar to stabilise [44]

	Maintaining patient position before measurement	[11,13]	- Patients rested for 20 minutes prior to measurement [29,45] - Patients resting for 10 minutes before repeated measurements taken [43] - Patients wait in testing room holding position for 5 min before measurement to stabilise cutaneous blood flow [5] - Patients allowed to adapt in controlled room to exclude external variables [46] - Patients remained supine for at least 5 minutes before measurement to avoid artefacts on Doppler imaging [13] - Patients allowed to acclimatise to room and assumed a supine position for a minimum of 10 minutes before measurements of biophysical parameters [11]
Measuring different skin layers	Measuring epidermis and/or dermis individually	[7,24,37,45,47-54]	- Measurement of epidermal, dermal and combined epidermal and dermal thickness to allow comparison with histological measurement [47,48] - Measurement of the epidermal and dermal thickness [45,49], combined with layer acoustic density [7] - Measurement of the epidermal, dermal and subcutaneous thickness, combined with acoustic density [50,51] - Measurement of dermal thickness as treatment thought to affect/target the dermis [24,37,52-54]
	Measuring both epidermis/dermis combined (no	[5,6,8,11,12,15,17,18,22,23,26,28,35,40,55-68]	- Combined epidermal and dermal thickness measurement to provide information on the full thickness of the scar [5,6,8,11,12,15,17,18,22,23,26,28,35,40,55-68]

	individual measurement)		
Measurement objective	Measuring fibrosis/oedema/hair follicles	8,10,11,13,14,16,17,24,25,29-32,34,36,37,45,54,58,60,61,63,64,69-82	- Measurement of fibrosis or collagen architecture [8,11,17,24,29-32,34,36,37,45,54,58,61,63,64,69,70,72-74,77-79,82] - Measurement of inflammation/oedema [14] - Quantification of the sub epidermal low echogenic band, indicating oedema [60] - Measurement of both fibrosis and oedema [10,13,16,25,58,71,75,76,80,81] - Measurement of the presence and density of hair follicles to differentiate scarred and unscarred skin[54]
Factors influencing scar site measurement	Measuring contralateral skin/control scar	9,14,15,23,29,30,52,55-58,83-88 6,8,12,18,22,25,38,43,54,59-61,66,89,90 39,40,45,79,81,82	- Measurement of additional, non-scarred subjects [55,79] - Measurement of unscarred/unaffected skin on same subject as scar measurement contralaterally or at anatomically similar location to provide normative measurements for skin thickness [6,8,9,12,14,15,18,22,23,29,30,38-40,43,45,52,54,56-61,66,81,85-90] - Measurement of both untreated scar and unaffected skin [82-84] - Measurement of a control scar subjected to care as usual treatment on the same individual [25]
	Measuring open wounds or sores in the scar	[6]	- Use of flexible transparent plastic wrap placed over the measurement area to prevent contact between ultrasound gel and transducer with the open wound/sore [6]
	Operator training and/or experience	6,8,12,14,16,18,20,24,27-29,31,39,40,58,61,66,72,73,87,91-93	- Trained outcome assessor [6,13,16,18,27,72] - Measurements taken by radiologist/sonographer [28,66,73,92]

Number of measurements per scar	5,6,8,9,11,12,20,23,25,26,31,34,37,40,44,45,47,52,54,57,60,61,66,68,79,85,92,94	- Assessors with burn experience [87,93] - Ultrasound located in department of radiology [91] - Measurements conducted by trained therapist/doctor under guidance of experienced radiologist [12,14,29,39] - Measurements conducted by trained clinicians who use device regularly and received training by company representative of devices [8,61] - Device-specific training provided: 1 week [20]; 3 sessions of 3 hours for 3 weeks, plus 10 independent assessments of scars using study protocol [40]; training provided over 3 months [31]; physical therapist trained in ultrasound application [24] - 3 ultrasound images taken from each patient [9,11,26,31,37,44,45,47,52,54,57,60,79,85] - Clearest of 3 measurements used [12] - 3 measurements in 3 locations across scar used. Individual and average measurements reported [40] - Measurements performed in duplicate [34,94] - Measurements taken at different points of the scar, thickest used for analysis [92] - 5 measurements of each site [6,23] - 9 measurements taken, removal of maximum and minimum, 7 measurements used for average [20] - Measurements taken by 3 assessors at 3 different time points during day [8,61] - Measurement of 2 sites on the same scar [25] - Single ultrasound image taken for analysis [68]

Use of additional measurement tools as well as ultrasound measurements	Using additional objective assessment instruments (e.g., histology, colour Doppler ultrasound, cutometer, colourimeter)	6,9-11,13,15,17,18,21-23,25-27,29,31,32,35,36,40-48,50,53,56-59,66,68-70,75-80,82-84,86-92,95-111	- Histology/immunohistochemistry 13,17,47,48,50,58,78,79,88,100,103,108,110 - Blood flow and blood perfusion measurement using laser Doppler perfusion imaging, flowmetry or PeriCam, and scar colour and micro-vessel percentage using dermoscopyolour and micro-vessel percentage. 35,69,70,83,84,86,87,92,99,101,108 - Oximeter 41 - Infra-red camera 41 - Measurement of scar stiffness or pliability/elasticity using elastography or cutometer 9,15,18,21,22,25-27,29,43,46,53,57,66,82-84,86,89,90,96,98,99,101,104-106 - Measurement of sensation using Semmes-Weinstein filaments 82-84,86 - Measurement of scar colour (including pigmentation and erythema) using spectrophotometer, colourimeter, chromameter, mexameter or Dermlite Foto IIPro 18,22,25-27,32,42,44-46,53,56,66,68,80,82,87,90,91,96-99,101-107,111 - Measurement of trans-epidermal water loss using Tewameter or scar hydration using Corneometer 46,53,96,99 - Measurement of sebum level using sebumeter 96,99 - Measurement of hardness using durometer 91 - Measurement of neovascularisation using echocontrastography 58 - Measurement of scar dimensions (e.g., scar height and volume) using 3D camera, 3D imaging methods, ruler or calliper 6,10,11,23,36,75,77

Using subjective assessment instruments (e.g., clinical rating scales, PROMs)	19,20,23,28-30,33,37,40,41,44,45,49,52,56,57,61,66,67,69-72,80-84,86,87,91,92,94-98,100,111-115	- Measurement of skin thickness using micrometer or optical coherence tomography [17,31,59,76,108-110] - Measurement of scar firmness or deformation using cicatrometer, force/torque sensor (in line with ultrasound to measure load applied) or torque meter [31,32,107] - Multi-parameter skin analysis device [66] - Measurement of erythema and elasticity using probes of DermaLab Combo [40] - Multi-probe adaptor taking multiple measurements (pigmentation, erythema, trans-epidermal water loss) [96] PROMs: - Measurement of scar quality using POSAS patient report [8,23,30,33,45,56,61,63,64,66,75-77,82,86,95,97,106,107,114,115] - Subjective rating scales for scar symptoms (e.g., pain, itch) or subjective scar severity ratings [26,30,41,42,53,63,64,72,80,83,84,93,102,103,111,115] - Patient quality of life questionnaires [75,76,101,107] - Measurement of generic health-related quality of life using CHU-9D [63,64] - Measurement of scar-specific health-related quality of life using BBSIP [63,64] - subjective evaluation of response to treatment/treatment satisfaction [81,116] Clinical rating scales: - Measurement of scar quality using POSAS observer report [8,23,30,33,45,53,56,61,63,64,66,75-77,82,86,87,97,98,106,114-116]

		- Measurement of physical scar characteristics using VSS or modified versions of the VSS [8,18-20,28,30,33,35,37,38,40,42-44,49,56,57,61,65,66,69-72,80-86,92-95,100-103,111-113,115,117,118] - Measurement of scar characteristics in relation to unscarred skin using Seattle Scar Scale or modified Seattle Scar Scale [73] - Subjective rating scales for scar symptoms (e.g., pain, itch) as assessed by the clinician and/or researcher and/or clinical evaluation of scar severity [11,29,41,52,57,67,73,91,92,94,96]
Determining the order of measurement	[6]	**-** Standardised order of measurement: 3D photograph, POSAS-O, then ultrasound [6] - Order of device use not specified [35,69,70,83,84,86,87,92,99,101,108]

Abbreviations: TUPS: Tissue Ultrasound Palpation System; 3D: three-dimensional; POSAS: Patient and Observer Scar Assessment Scale; CHU-9D: Child Health Utility 9D; BBSIP: Brisbane Burn Scar Impact Profile; VSS: Vancouver Scar Scale; mVSS: Modified Vancouver Scar Scale; POSAS-O: Patient and Observer Scar Assessment Scale, observer measure

BM, MS, TM, TR, BD, RK, ZT – Ultrasound Scoping Review: Supplement

Supplement References:

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