

Appendix 1: Literature Search Strategy

DISTAL FOREARM

Databases searched:

Pubmed

Dates of Search:

October 12-25, 2018

Oct 29-Nov 4, 2018

Search terms (list separately for each question), including limits (e.g. restricted to certain dates, English language, etc):

forearm AND osteoporosis AND children

wrist AND osteoporosis AND children

forearm AND osteoporosis AND paediatrics

forearm AND references

reference AND children AND upper extremities

reference AND children AND forearm

reference AND children AND wrist

DXA AND children AND forearm

Radius AND Children AND DXA

Number of articles initially identified by search strategy:

43+8+93+39+36+6+13+73+128=439

Pubmed search:

Search (((((((((((radius[MeSH Terms]) OR forearm[MeSH Terms])) AND humans[MeSH Terms]) AND bone density[MeSH Terms]) OR bone mineral density[MeSH Terms]) OR density, bone mineral[MeSH Terms]) OR density, bone[MeSH Terms])) AND absorptiometry,

photon[MeSH Terms] OR absorptiometry, dual energy x ray[MeSH Terms] OR
absorptiometry, dual x ray[MeSH Terms]

Limits: English & Humans, All Child (0 to 18 years)

Results returned: 4514

Criteria used to discard articles or studies:

Adult studies, Lack of relevance to questions in the task force; adult studies involving
information outside the focus

Final number of studies identified and used in literature review: 59

PROXIMAL FEMUR

Databases searched:

EBM Reviews - Cochrane Central Register of Controlled Trials September 2018, EBM Reviews - Cochrane Database of Systematic Reviews 2005 to October 24, 2018, Embase 1974 to 2018 October 30, Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to October 30, 2018

Search Strategy:

#	Searches	Results
1	exp Bone Density/	137752
2	("bone densit*" or "bone mass" or "bone mineral content*" or "bone mineral densit*" or "osseous densit*" or "osseous mass" or "osseous mineral content*" or "osseous mineral densit*").ti,ab,hw,kw.	213238
3	1 or 2	213371
4	(adolescent* or boy or boys or child* or girl or girls or infant* or neonat* or newborn* or paediatric* or pediatric* or prepuberty or "pre-puberty" or preschooler* or "pre-schooler*" or preteen or "pre-teen" or preteens or "pre-teens" or puberty or teen or teenager* or teens or toddler* or youth or youths).ti,ab,hw,kw.	8108184
5	3 and 4	32933
6	(DEXA or "dual energy absorptiometry" or "dual energy x ray absorptiometry" or "dual energy xray absorptiometry" or "dual x ray absorptiometry" or "dual xray absorptiometry" or DXA or "Hologic QDR 2000" or "Hologic QDR 4500").ti,ab,hw,kw.	81700
7	5 and 6	10997
8	exp Reference Values/	287316
9	("normal curve*" or "normal data" or "normal percentile*" or "normal range*" or "normal reference*" or "normal value*" or "normative curve*" or "normative data" or "normative database*" or "normative dataset*" or "normative percentile*" or "normative range*" or "normative reference*" or "normative standard*" or "normative value*" or "reference curve*")	

or "reference data" or "reference database*" or "reference dataset*" or "reference percentile*" or "reference range*" or "reference standard*" or "reference value*").ti,ab,hw,kw.574361

10 8 or 9 574996

11 7 and 10 1265

12 precision.ti,ab,hw,kw. 266597

13 7 and 12 180

14 exp Fractures, Bone/ 431698

15 ("broken bone*" or fracture*).ti,ab,hw,kw. 642390

16 14 or 15 651384

17 7 and 16 2927

18 11 or 13 or 17 3971

19 limit 18 to english language [Limit not valid in CDSR; records were retained] 3769

20 (case* adj3 report*).mp,pt. 4592576

21 19 not 20 3521

22 limit 21 to (letter or editorial or erratum or note or addresses or autobiography or bibliography or biography or blogs or comment or dictionary or directory or interactive tutorial or interview or lectures or legal cases or legislation or news or newspaper article or overall or patient education handout or periodical index or portraits or published erratum or video-audio media or webcasts) [Limit not valid in CCTR,CDSR,Embase,Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher; records were retained] 52

23 21 not 22 3469

24 remove duplicates from 23 2434

25 ("normal curve*" or "normal data" or "normal percentile*" or "normal range*" or "normal reference*" or "normal value*" or "normative curve*" or "normative data" or "normative database*" or "normative dataset*" or "normative percentile*" or "normative range*" or "normative reference*" or "normative standard*" or "normative value*" or "reference curve*" or "reference data" or "reference database*" or "reference dataset*" or "reference percentile*"

or "reference range*" or "reference standard*" or "reference value*").ti. and 24 81

26 ("broken bone*" or fracture*).ti. and 24 331

27 25 or 26 408

Eliminated articles

(2010 to current as of 11-4-2018)

Total = 231

- Non-human study N=4
- Did not report prox femur N=74
- Adult study N=69
- No DXA assessment for reference database or risk of fracture or other outcome
N=52
- Duplicate N=15
- Review article N=8
- Case report/series N=2
- Hip data not reported (abstracts) N=5

Eliminated articles

(1993 to 2009)

Total = 121

- Non-human study N=2
- Did not report prox femur N=50
- Adult study N=31
- No DXA assessment for reference database or risk of fracture or other outcome
N=18
- Duplicate N=8
- Review article N=9
- Case report/series N=0

- Hip data not reported or not relevant (abstracts)

N=3

LATERAL DISTAL FEMUR

Databases searched:

EmBASE

Scopus

Medline

Pubmed

Dates of Search: 1/1/1985 through 10/10/2018

Search terms (list separately for each question), including limits (e.g. restricted to certain dates, English language, etc):

These are the keywords and medical subject headings [MeSH] terms that were used across each search:

Femur:

- "lateral femur"
- "lateral distal femur"
- "distal femur"
- ((distal OR lateral) AND "Femur"[Mesh])

Bone Health:

- "bone health"
- "bone density"
- "bone mineral density"
- "bone mineral"
- "bmd"
- "Bone Demineralization Technique"[Mesh]
- "Bone Density"[Mesh]
- "Fractures, Bone"[Mesh]) OR "Osteoporosis"[Mesh]

Imaging:

- "Absorptiometry, Photon"[Majr]
- "Absorptiometry, Photon"[Mesh]
- DEXA
- DXA
- "dual energy x-ray absorptiometry "
- "dual energy xray absorptiometry "

NOT

- Dexamethasone
- "Infant"[Mesh]
- "Child"[Mesh]
- "Adolescent"[Mesh]
- Mouse
- Rat
- rabbit

EMBASE

lateral AND distal AND ('femur' OR 'femur'/exp OR femur) AND (dxa OR 'dexa' OR 'dexa'/exp OR dexa OR 'dual energy x ray absorptiometry'/exp OR 'dual energy x ray absorptiometry')

PubMed

Pediatric:

"Femur"[Mesh] AND Humans[Mesh] AND English[lang] AND (Humans[Mesh] AND English[lang])) AND (((("bone health") OR "bone density") OR "bone mineral density") OR "bone mineral") OR "bmd") OR (((("Bone Demineralization Technique"[Mesh]) OR "Bone Density"[Mesh]) OR "Fractures, Bone"[Mesh]) OR "Osteoporosis"[Mesh])) AND (((((((("Absorptiometry, Photon"[Majr]) OR "Absorptiometry, Photon"[Mesh]) OR dexa) OR dxa) OR dual energy xray absorptiometry) OR "dual energy x-ray absorptiometry ") OR "dual energy xray absorptiometry ") NOT dexamethasone) Filters: Humans; English; Child: birth-18 years

All, adults and pediatric:

Search (((((((("lateral femur") OR "lateral distal femur") OR "distal femur") OR (((distal) OR lateral) AND "Femur"[Mesh]) AND Humans[Mesh] AND English[lang]) AND (Humans[Mesh] AND English[lang]))) AND (((((((("bone health") OR "bone density") OR "bone mineral density") OR "bone mineral") OR "bmd") OR (((("Bone Demineralization Technique"[Mesh]) OR "Bone Density"[Mesh]) OR "Fractures, Bone"[Mesh]) OR "Osteoporosis"[Mesh]))) AND (((((((("Absorptiometry, Photon"[Majr]) OR "Absorptiometry, Photon"[Mesh]) OR dxa) OR dxa) OR dual energy xray absorptiometry) OR "dual energy x-ray absorptiometry ") OR "dual energy xray absorptiometry ") NOT dexamethasone) Filters: Humans; English

Adults only:

Search (((((((((((((((("lateral femur") OR "lateral distal femur") OR "distal femur") OR (((distal) OR lateral) AND "Femur"[Mesh]) AND Humans[Mesh] AND English[lang]) AND (Humans[Mesh] AND English[lang]))) AND (((((((("bone health") OR "bone density") OR "bone mineral density") OR "bone mineral") OR "bmd") OR (((("Bone Demineralization Technique"[Mesh]) OR "Bone Density"[Mesh]) OR "Fractures, Bone"[Mesh]) OR "Osteoporosis"[Mesh]))) AND (((((((("Absorptiometry, Photon"[Majr]) OR "Absorptiometry, Photon"[Mesh]) OR dxa) OR dxa) OR dual energy xray absorptiometry) OR "dual energy x-ray absorptiometry ") OR "dual energy xray absorptiometry ") NOT dexamethasone)) AND Humans[Mesh] AND English[lang])) NOT ("Infant"[Mesh] AND Humans[Mesh] AND English[lang])) NOT ("Child"[Mesh] AND Humans[Mesh] AND English[lang])) NOT ("Adolescent"[Mesh] AND Humans[Mesh] AND English[lang])) AND Humans[Mesh] AND English[lang])) NOT mouse) NOT rat) NOT rabbit Filters: Humans; English

SCOPUS

(TITLE-ABS-KEY ("lateral distal femur" OR "distal femur") AND TITLE-ABS-KEY ("bone density" OR "bone mineral" OR fracture OR osteoporosis) AND TITLE-ABS-KEY ("photon absorptiometry" OR "dual energy x-ray absorptiometry" OR "dual energy xray absorptiometry" OR dxa OR dxa) AND NOT TITLE-ABS-KEY (mice OR rat OR rabbit)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-

TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ip") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English"))

((TITLE-ABS-KEY ("lateral distal femur" OR "distal femur") AND TITLE-ABS-KEY ("bone density" OR "bone mineral" OR fracture OR osteoporosis) AND TITLE-ABS-KEY ("photon absorptiometry" OR "dual energy x-ray absorptiometry" OR "dual energy xray absorptiometry" OR dexa OR dxa) AND NOT TITLE-ABS-KEY (mice OR rat OR rabbit))) AND (child OR children OR pediatric OR adolescent) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ip") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English"))

MEDLINE

1. lateral femur
2. "lateral femur".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
3. "lateral distal femur".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
4. "distal femur".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
5. distal {Including Related Terms}
6. lateral {Including Related Terms}
7. femur {Including Related Terms}
8. FEMUR/
9. 2 or 3 or 4
10. 5 or 6

11. 10 and 8
12. 11 or 9
13. Osteoporosis/ or Bone Density/
14. "bone health".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
15. "bone density".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
16. "bone mineral density".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
17. "bone mineral".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
18. "bmd".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
19. bone demineralization.mp.
20. Fractures, Bone/
21. 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20
22. Absorptiometry, Photon/
23. dxa {Including Related Terms}
24. dxa {Including Related Terms}
25. "dual energy x-ray absorptiometry".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word,

protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

26. "dual energy xray absorptiometry".mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

27. 22 or 23 or 24 or 25 or 26

28. 12 and 21 and 27

29. limit 28 to (english language and humans and "all child (0 to 18 years)")

30. from 29 keep 1-5, 7-10, 12-42

31. limit 28 to (english language and humans and "all adult (19 plus years)")

Number of articles initially identified by search strategy:

Pub Med Pediatric n=40

Pub Med Adult n=86

Criteria used to discard articles or studies:

Lack of relevance to questions; adult studies involving information outside of questions at hand

Final number of studies identified and used in literature review:

Total included on Lit Review Grid n= 33

Pediatric n=32

Adult n=1

VERTEBRAL FRACTURE ASSESSMENT

Databases searched: Medline

Dates of Search: 11/1/2018

Search terms (list separately for each question), including limits (e.g. restricted to certain dates, English language, etc):

vertebral fractures + children + DXA (n=76)

OR

spine fractures + children + DXA (n=127)

OR

Fractures + children + VFA (n=8)

Number of articles initially identified by search strategy:

211 incl. duplicates

Criteria used to discard articles or studies:

All studies that did not use VFA and lateral radiographs in the same subjects

Final number of studies identified and used in literature review:

6