

**Instructional methods used by health sciences librarians to teach evidence-based practice (EBP): a systematic review**

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**Table 1**  
 Summary of 27 included studies

Ref. no.	Subject area	Librarian role	Instructional method	Instructional time	EBP skills addressed in instruction*					Study design	Sample size	Assessments			Outcome significance§
					Ask	Acquire	Appraise	Apply	Assess			Skills	Self-reported†	Validated‡	
14	Medical	Curriculum, teaching, assessment, author, library and information science (LIS) faculty	Lecture, small group/1-on-1, online	1.5-hour session (intervention: online learning module, control: traditional instructor-led)		✓				Randomized controlled trial (blinded); pre-, post	128: Intervention 65 Control 63	✓	✓		Trend toward significance
15	Medical	Curriculum, teaching, assessment, author	Lecture, computer lab	1 3-hour workshop	✓	✓				Program evaluation; pre-, post (no control group or randomization)	42 ~7 students per workshop session	✓			Minimum significance
16	Medical	Curriculum, teaching, assessment, author	Small group/1-on-1	Individual sessions, length not specified	✓	✓				Randomized controlled trial (blinded); pre-, post	10 Intervention 5 Control 5	✓	✓		No statistically significant results reported

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					Ask	Acquire	Appraise	Apply	Assess			Skills	Self-reported†	Validated‡	
17	Medical	Curriculum, teaching, assessment, author	Lecture	8 1-hour weekly evidence-based medicine (EBM) seminars (internal medicine clerkship)	✓	✓	✓	✓		Course evaluation study; pre-, post (no control group or randomization)	41	✓	✓		High, good, and minimum significance
18	Medical	Curriculum, teaching, assessment, author	Lecture, small group/1-on-1	6 2-hour sessions (credit-bearing elective course)	✓	✓	✓	✓	✓	Course evaluation study; pre-, post (no control group or randomization)	30	✓	✓	✓ B	High and good significance
19	Medical	Teaching, author, assessment	Lecture, computer lab	1 2-hour workshop	✓	✓				Randomized controlled trial (single-blinded)	121: Intervention 62 Control 59	✓	✓	✓ F E*	Minimum significance
20	Medical	Curriculum, teaching, assessment, author	Lecture, computer lab, small group/1-on-1	5 1.5-hour sessions (credit-bearing elective course)	✓	✓	✓			Course evaluation study; pre-, post (no control group or randomization)	51	✓	✓		No statistically significant results reported
21	Medical	Teaching, assessment, author	Lecture, computer lab, peer assessment	2 sessions with 3rd session for formative test (length not specified)		✓				Randomized controlled trial	71: Intervention 47 Control 24	✓			Trend toward significance

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22	Medical	Curriculum, teaching, assessment, author	Lecture, computer lab, small group/1-on-1	1 1.5-hour workshop	✓	✓	✓	✓		Program evaluation; pre-, post (no control group or randomization)	150	✓			No statistically significant results reported
23	Medical	Curriculum, teaching, assessment, author	Lecture	1 1.5-hour session (review session)	✓	✓				Program evaluation (no control group or randomization)	177	✓	✓		No statistically significant results reported
24	Physician Assistant	Curriculum, teaching, assessment, author	Online	Video tutorials 7–27 minutes long; accompanying materials (part of a credit-bearing online course)	✓	✓				Course evaluation study over 3 years (no control group or randomization)	150	✓			No statistically significant results reported
25	Medical	Curriculum, teaching, assessment, author	Lecture, computer lab, small group/1-on-1	3 sessions (credit-bearing required course)	✓	✓	✓			Course evaluation study; pre-, post (no control or randomization)	319	✓			High significance
26	Medical/Dental	Curriculum, teaching, assessment, author	Lecture, computer lab, small group/1-on-1	6 4-hour problem-based learning (PBL) sessions	✓	✓				Randomized (group level) controlled study; pre-, post	164: 18 PBL groups divided into Intervention 6 Control 12	✓	✓		High and good significance

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27	Graduate Health Program	Curriculum, teaching, assessment, author	Lecture, small group/1-on-1, online	2 3-hour sessions, 1 online text-based tutorial (1–2 hours to complete) (part of credit-bearing course)	✓	✓				Program evaluation; pre-, post (no control group or randomization)	13	✓	✓		High, good, and minimum significance
28	Physical Therapy (PT)/ Occupational Therapy (OT)	Curriculum, teaching, assessment, author	Lecture, computer lab	2 1.5-hour workshops (part of credit-bearing required course)	✓	✓				Program evaluation (no control group or randomization)	104	✓			No statistically significant results reported
29	Medical	Teaching, assessment	Computer lab	2 day, 6 hours each day EBM refresher for all; 1 30–90-minute session with intervention group	✓	✓	✓			Randomized controlled trial	18: Intervention 9 Control 9	✓		✓ F*	High and good significance
30	Medical	Curriculum, teaching, assessment, author	Small group/1-on-1, online	2 online modules; small-group follow up sessions (length not specified)	✓	✓		✓		Course evaluation study (no control group or randomization)	Not reported	✓			No statistically significant results reported
31	Medical	Curriculum, teaching, author	Lecture, small group/1-on-1	3 or 4 weekly 2-hour seminars	✓	✓	✓			Program evaluation; pre-, post (no control group or randomization)	69	✓		✓ F*	High, good, and minimum significance

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					Ask	Acquire	Appraise	Apply	Assess			Skills	Self-reported†	Validated‡	
32	Medical	Teaching	Computer lab	1 4-hour workshop	✓	✓	✓	✓		Randomized controlled trial; pre-, post	48: Intervention 23, Control 25)	✓	✓		High, good, and minimum significance
33	Medical	Curriculum, teaching, assessment, author	Lecture, small group/1-on-1	1 1-hour session; weekly 30-minute sessions for each 6–8 week rotation	✓	✓		✓		Randomized controlled trial (blinded)	48 Intervention 24 Control 24	✓ **	✓		High and good significance
34	Medical	Curriculum, teaching, assessment, author	Lecture, small group/1-on-1, online	2 1-hour lectures; 3 2-hour small-group sessions; supplemental self-directed online learning website (1-month credit bearing course)	✓	✓	✓	✓		Program evaluation (no control group or randomization)	139	✓	✓		High and minimum significance
35	Medical	Curriculum, teaching, assessment, author	Computer lab, small group/ 1-on-1	6 tutorial sessions (intervention) medical conference (control) (length not specified)	✓	✓		✓		Randomized controlled trial	77: Intervention 40 Control 37	✓	✓		High, good, and minimum significance

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					Ask	Acquire	Appraise	Apply	Assess			Skills	Self-reported†	Validated‡	
36	Medical	Curriculum, teaching, assessment, author	Lecture, computer lab, small group/1-on-1	Instruction sessions; individual and small-group work; and group presentations throughout 4-year medical school curriculum	✓	✓	✓	✓		Program evaluation (no control group or randomization)	256	✓			No statistically significant results reported
37	Medical	Curriculum, teaching, assessment, author	Lecture, computer lab	1 2-hour session (optional supplement to elective course)	✓	✓				Nonrandomized controlled study; pre-, post	92: Intervention 34 Control 58	✓			Minimum significance
38	Medical	Curriculum, teaching, assessment, author, LIS faculty	Online	Online EBM curriculum (supplement to standard family medicine clerkship for intervention group) estimated 40–60 minutes to complete		✓	✓	✓		Randomized controlled trial (blinded)	238: Intervention 134 Control 104	✓	✓		High, good, and minimum significance

Ref. no.	Subject area	Librarian role	Instructional method	Instructional time	EBP skills addressed in instruction*					Study design	Sample size	Assessments			Outcome significance§
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39	PT/OT/ Respiratory Therapy (RT) /Physician Assistant (PA)	Curriculum, teaching, assessment, author	Lecture, computer lab, small group/1-on-1	7 weekly 3-hour sessions (credit-bearing required course)		✓	✓	✓		Nonrandomized controlled study; pre-, post	253: Intervention 189 (PT/OT/RT) Control (PA) 64	✓	✓		High and good significance
40	Nursing	Curriculum, teaching, assessment, author	Lecture, computer lab	4 sessions totalling 4.5 hours over 3 semesters (group A), 2 sessions totalling 2 hours over 1 semester (group B)		✓				Prospective cohort study, pre-, post; control and intervention groups, no randomization	90 Intervention 60 Control 30	✓			No statistically significant results reported

\* EBP skills addressed in instruction: **Ask**: population, intervention, comparison, outcomes (PICO) question format or clinical question development; **Acquire**: search strategy development, searching techniques, information sources, study selection, acquiring full-text using institutionally specific or other services and options like full-text linkers and interlibrary loan; **Appraise**: critical appraisal of evidence (studies selected) for any one or more of the following: study design, level of evidence based on hierarchy of evidence, statistics use and reporting, therapy/diagnosis/other question-type specific indicators such as likelihood ratios, number needed to treat, absolute risk reductions, etc., evaluation methods for qualitative and quantitative study designs, and for websites; **Apply**: application of evidence to clinical case, clinical scenario, or other case study; **Assess**: discussion or practice evaluating application of evidence to clinical case, clinical scenario, or other case study.

† Self-reported: Study includes a measure of participant self-reported attitude, confidence, or perceived change in skill level.

‡ Validated: Use of a validated assessment tool to measure EBP skills or for self-reported measures of attitude, confidence, or perceived change in skill level. Validated assessments used in studies in this systematic review include: **F**=Fresno test [42], **F\***=partial use of Fresno test, **B**=Berlin Questionnaire [41], **E\***=partial use of Evidence-Based Practice Questionnaire [43]

§ Outcome significance: As part of reviewing the included studies, each was rated regarding statistical significance of measured outcomes, using the following categories: **High significance**=adequate to strong study design,  $p < 0.001$  or less on at least 1 measure; **Good significance**=adequate or better study design with  $0.001 < p < 0.02$  on at least 1 measure; **Minimum significance**=adequate or better study design with  $0.02 < p \leq 0.05$  on at least 1 measure; **Trend toward significance** with  $0.05 < p < 0.1$  on at least 1 measure. **No statistically significant results** reported.

\*\* This study's skills assessment was unique in its use of library system web server log data to measure EBP skills performance related to searching as part of the evaluation of the post-intervention searching activity. Data collected included logons to Ovid MEDLINE, searching volume, abstract and full-text views, and total searching time.