

# From Clinical Question to Search Strategy: The role of the Information Scientist

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**Aim:** To show how a clinical question about interventions formulated using the PICO (Population, Intervention, Comparison, Outcome)<sup>1,2</sup> framework is turned into a systematic search by the Information Scientist in guideline development<sup>3</sup>

**Clinical Question:** example taken from the **Type 2 Diabetes. National clinical guideline for management in primary and secondary care (update)**

Are the glitazones (pioglitazone and rosiglitazone) effective in the control of blood glucose in people with type 2 diabetes either alone or in combination compared to other antidiabetic treatment regimens?

## Outline of PICO format used to develop a clinical question using the above example

| PICO element  | Corresponding components  |
|---|---|
| <b>Population</b> <ul style="list-style-type: none"> <li>Who or what is the question about?</li> <li>What are the most important characteristics of the patient / population / problem?</li> <li>This may include the primary problem, disease or co-existing conditions.</li> <li>The sex, age or ethnicity of the patient may be relevant (to the diagnosis or treatment of a condition)</li> </ul>   | Type 2 Diabetes   |
| <b>Intervention</b> <ul style="list-style-type: none"> <li>What is the main intervention you are considering?</li> </ul>  | Glitazone<br>Pioglitazone<br>Rosiglitazone  |
| <b>Comparison</b> <ul style="list-style-type: none"> <li>What is the main alternative intervention/ treatment considered if any?</li> <li>Are you trying to decide between one drug and another, a drug and placebo, drugs within a class, drugs between classes, a head to head comparison</li> </ul> <p>Note: You do not require to always have a specific comparison</p>   | Other antidiabetic treatments   |
| <b>Outcomes</b> <ul style="list-style-type: none"> <li>What are you trying to accomplish, measure, improve or affect?</li> <li>What are you trying to find out for the patient e.g. relief and/or elimination of symptoms, improvement in function tests or quality of life?</li> </ul> <p>Note: Outcomes are not always mentioned in the abstracts or subject headings of databases so it is NOT advisable to use them in constructing a search.</p> | HbA1c<br>Fasting plasma glucose (FPG)<br>Post-load glucose (PLG)<br>Post-prandial Blood Glucose (PPBG) Post-prandial Glucose Excursion (PPGE)<br>Lipid profile<br>Body weight / BMI |
| <b>Exclusions</b> <ul style="list-style-type: none"> <li>What can you exclude? E.g. animal studies, from the scope</li> </ul>   | Animal studies<br>From scope: Diabetes insipidus, Pregnancy diabetes, Paediatric diabetes, Prediabetic state, Diabetic ketoacidosis   |
| <b>Study types</b> <ul style="list-style-type: none"> <li>What type of study will provide you with the best answer?</li> </ul>  | Randomised Control Trials (RCTs),<br>Systematic Reviews (SRs)   |
| <b>Limits</b> <ul style="list-style-type: none"> <li>Limits e.g. year range, English language</li> </ul>  | year 2001 to present<br>English language  |

## Literature Search techniques:

- Construct search strategy according to systematic structure e.g PICO
- Carry out literature searches for each individual PICO element and then combine using Boolean operators; **OR** to combine similar concepts, **AND** to combine different concepts and **NOT** to exclude concepts
- Use a combination of text words and subject headings in agreement with Clinical Advisor and/or GDG (include synonyms, acronyms, differences in spelling (e.g. odema/oedema), old and new terminology, brand and generic names)
- Use truncation for text words e.g. diabet\$ will find diabetic, diabetes
- Explode subject headings where appropriate to include narrow terms e.g. Diabetes Mellitus, Type 2, includes Diabetes Mellitus, Liopatrohic
- Any limits and exclusions should be carried out with caution, carry out a quality assurance check to test results of retrieval
- Use search filters if required to identify particular types of research studies, e.g. RCT filter, SR filter
- When re-running a searches, update search terms and filters to reflect any changes

## MEDLINE SEARCH STRATEGY

Date search strategy constructed: 12/5/06

Date filters updated: 22/5/08

Date search re-run: 3/7/08

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1  exp Diabetes Mellitus, Type 2/ (50476)
2  ((typ$2 or typ$11 or typ$ 11) adj2 diabet$.ti.ab. (58919)
3  NIDDM.ti.ab. (6719)
4  ((adult$ or matur$ or late or slow or stable) adj2 diabet$.ti.ab. (4877)
5  ((non insulin or non-insulin or noninsulin) adj2 (depend$ adj2 diabet$.ti.ab. (10921)
6  or/1-5 (87805)
7  exp Hyperglycemia/ (16957)
8  exp Hyperinsulinism/ (32459)
9  (impaired adj2 glucose adj2 toleranc$.ti.ab. (5866)
10 (insulin$ adj2 resistanc$.ti.ab. (29121)
11 (glucose adj2 intoleranc$.ti.ab. (4987)
12 or/7-11 (63203)
13 diabet$.ti.ab. (211890)
14 diabetes mellitus/ (72584)
15 13 or 14 (240857)
16 12 and 15 (28279)
17 6 or 16 (100280) POPULATION
18 exp Diabetes Mellitus, Experimental/ (25125)
19 exp Diabetes, Gestational/ (4013)
20 exp Diabetic Ketoacidosis/ (4385)
21 exp Prediabetic State/ (2386)
22 exp Diabetes Insipidus/ (6313)
23 diabet$ insipidus.ti.ab. (5909)
24 or/18-23 (43402) EXCLUSIONS FROM SCOPE
25 17 not 24 (94002) FINAL POPULATION (Boolean command = Population NOT Exclusions
from Scope)
26 limit 25 to english language (80880) FINAL POPULATION WITH ENGLISH LANGUAGE
LIMIT
27 exp Thiazolidinediones/ (5344)
28 Glitazone$.ti.ab. (374)
29 Pioglitazone.ti.ab. (1689)
30 Rosiglitazone.ti.ab. (2285)
31 exp PPAR gamma/ (2889)
32 (PPAR adj3 gamma adj3 agonist$.ti.ab. (660)
33 TZD.ti.ab. (494)
34 or/27-33 (8487) INTERVENTION
35 exp Hypoglycemic Agents/ (152375)
36 Hypoglycemic$.ti.ab. (8739)
37 (Hypoglycemic adj2 agent$.ti.ab. (1709)
38 (Hypoglycemic adj2 drug$.ti.ab. (455)
39 antidiabetic$.ti.ab. (4922)
40 (antidiabetic adj2 agent$.ti.ab. (1219)
41 (antidiabetic adj2 drug$.ti.ab. (1111)
42 anti-diabetic$.ti.ab. (930)
43 or/35-42 (157759) COMPARISON
44 26 and 34 and 43 (2026) RESULT (Boolean Command = Limited Final Population AND
Intervention AND Comparison)
45 letter/ (661922)
46 editorial/ (239094)
47 exp historical article/ (276281)
48 Anecdotes as Topic/ (2827)
49 comment/ (388362)
50 case report/ (1403241)
51 animal/ not (animal/ and human/) (3233627)
52 Animals, Laboratory/ (8565)
53 exp animal experiment/ (3725)
54 exp animal model/ (295210)
55 exp Rodentia/ (2167118)
56 or/45-55 (6131361)
57 44 not 56 (1372) FINAL RESULT (Boolean Command = Result NOT Exclusions)
58 "review" or review.pt. or review.ti. (1481535)
59 (systematic or evidence$ or methodol$ or quantitativ$ or analys$ or assessment$.ti.sh.ab.
(3212140)
60 58 and 59 (303505)
61 meta-analysis.pt. (18965)
62 Meta-Analysis/ (18965)
63 exp Meta-Analysis as Topic/ (8473)
64 (meta-analy$ or metanaly$ or metaanaly$ or meta analy$.mp. (36179)
65 ((systematic$ or evidence$ or methodol$ or quantitativ$) adj5 (review$ or survey$ or
overview$.ti.ab.sh. (57151)
66 ((pool$ or combined or combining) adj (data or trials or studies or results)).ti.ab. (8803)
67 or/60-66 (345503) SR FILTER
68 randomized controlled trial.pt. (261792)
69 controlled clinical trial.pt. (79616)
70 double-blind method/ or random allocation/ or single-blind method/ (162892)
71 exp Clinical Trial/ (556884)
72 exp Clinical Trials as Topic/ (208828)
73 clinical trial.pt. (456603)
74 random$.ti.ab. (452532)
75 ((clin$ or control$) adj5 trial$.ti.ab. (205017)
76 ((singl$ or doubl$ or treb$ or tripl$) adj25 (blind$ or mask$)).ti.ab. (102762)
77 Placebos/ or placebo$.ti.ab. (130130)
78 (volunteer$ or "control group" or controls or prospectiv$.ti.ab. (913624)
79 Cross-Over Studies/ (22519)
80 ((crossover or cross-over or cross over) adj2 (design$ or stud$ or procedure$ or
trial$.ti.ab. (31178)
81 or/68-80 (1730560) RCT FILTER
82 67 or 81 (2001589) (Boolean Command = RCT Study Type or SR Study Type)
83 57 and 82 (902) (Boolean Command = FINAL RESULT ((Limited Final Population AND
Intervention AND Comparison) NOT Exclusions) AND
Study Types
84 limit 83 to yr="2001 - 2008" (790) LIMITED = ABSOLUTE FINAL RESULT
    
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## Conclusion

A well constructed clinical question will assist in formulating a rigorous and systematic literature search. To retrieve relevant results and achieve a balance between sensitivity and precision requires specialist Information Scientist skills. The Information Scientist will ensure: a) that all relevant search terms are included in the search strategy (in agreement with the Clinical Advisor and/or GDG) and are updated when required; b) that search terms are in a form that will be retrievable by databases; c) that particular concepts are combined, excluded or limited appropriately.

**Quality Assurance:** In addition the Information Scientist checks retrospectively that key papers for the clinical question have been retrieved in the literature search.

1 Sackett, David L. Evidence-Based Medicine: How to Practice and Teach EBM, 2nd edition New York: Churchill Livingstone, 2000

2 National Institute for Health and Clinical Excellence. Guidelines Manual. Chapter 5: Developing clinical questions. London:NICE. 2007. Available from: [www.nice.org.uk/guidelinesmanual](http://www.nice.org.uk/guidelinesmanual)

3 Boynton J. Pledge D. Richards A. Clinical guideline development in England and Wales: the role of the information specialist Poster presented at the 5th Guidelines International Network (G-I-N) Conference, 1-3 October 2008, Helsinki, Finland.