

**ECONOMIC MODELLING OF CHRONIC KIDNEY DISEASE: A SYSTEMATIC LITERATURE  
REVIEW TO INFORM CONCEPTUAL MODEL DESIGN**

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## Online Resource 1

**Supplementary Table 1. Medline (PubMed) search terms for studies of health economic models for the simulation of patients with CKD**

#	Search terms	Number of hits
1	"Kidney Failure, Chronic"[MeSH Terms]	85,711
2	"Renal Insufficiency, Chronic"[MeSH Terms]	98,686
3	"Renal Insufficiency"[MeSH Terms]	148,597
4	"Kidney Diseases"[MeSH Terms]	463,879
5	nephrop*[Text Word] OR kidney[Text Word] OR renal[Text Word]	983,057
6	(endstage[Text Word] OR end-stage[Text Word]) AND (renal[Text Word] OR kidney*[Text Word])	38,447
7	proteinuri*[Text Word] OR albuminuria*[Text Word] OR uremia*[Text Word] OR uraemia*[Text Word]	80,885
8	(kidney[Title/Abstract] OR renal[Title/Abstract]) AND (disease*[Title/Abstract] OR failure*[Title/Abstract] OR sufficien*[Title/Abstract] OR insufficien*[Title/Abstract])	304,861
9	esrd[Title/Abstract] OR eskd[Title/Abstract] OR esrf[Title/Abstract] OR ckd[Title/Abstract] OR ckd[Title/Abstract] OR crf[Title/Abstract] OR crd[Title/Abstract]	49,432
10	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9	1,066,111
11	"economics, medical"[MeSH Terms]	13,976
12	"economic evaluation" OR "economic evaluations"	9,753
13	"fee" or "fees"	38892
14	"health care costs"[MeSH Terms]	55976
15	"drug costs"[MeSH Terms]	14135
16	"cost-benefit analysis"[MeSH Terms] OR "cost effectiveness"[Text Word] OR "cost-effectiveness"[Title/Abstract] OR CEA[Title/Abstract]	112737
17	cost[Title/Abstract] OR costs[Title/Abstract] OR costing[Title/Abstract]	437362
18	"cost effective*"[Title/Abstract] OR "cost utilit*"[Title/Abstract] OR "cost benefit*"[Title/Abstract] OR "cost minimi*"[Title/Abstract]	81,117
19	economic*[Title/Abstract] OR pharmacoeconomic*[Title/Abstract]	230,698
20	expenditure*[Title/Abstract] NOT energy[Title/Abstract]	24,366
21	value[Title/Abstract] AND money[Title/Abstract]	2,461
22	Budget*[Title/Abstract]	24,724
23	#11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22	724,013
24	"energy cost"[Title/Abstract] OR "oxygen cost"[Title/Abstract]	3,560
25	"metabolic cost"[Title/Abstract]	1,173
26	"energy expenditure"[Title/Abstract] OR "oxygen expenditure"[Title/Abstract]	21,496
27	#24 OR #25 OR #26	25,326
28	#23 NOT #27	718,241
29	#10 AND #28	17,889
30	"quality adjusted life year*" OR "quality-adjusted life year" OR QALY	14,540
31	"incremental cost effectiveness ratio*" OR ICER	4,987
32	"life year" OR "life-year"	5,991
33	#30 OR #31 OR #32	17,714
34	#29 AND #33	569
35	case report OR case study OR letter OR editorial OR case reports[Publication Type] OR letter[Publication Type] OR editorial[Publication Type]	3,244,456
36	#34 NOT #35	556
37	#36 AND English [Language]	539

**Supplementary Table 2. EMBASE search terms for studies of health economic models for the simulation of patients with CKD**

#	Search terms	Number of hits
1	'renal insufficiency, chronic'/exp OR 'renal insufficiency, chronic'	119,108
2	'kidney failure, chronic'/exp OR 'kidney failure, chronic'	119,210
3	'kidney failure'/exp OR 'kidney failure'	338,896
4	'renal insufficiency'/exp OR 'renal insufficiency'	343,721
5	nephrop* OR kidney OR renal	1,383,144
6	(endstage OR 'end-stage') AND (renal OR kidney*)	61,709
7	Proteinuria* OR albuminuria* OR uremia* OR uraemia*	119,894
8	(kidney:ti,ab OR renal:ti,ab) AND (disease*:ti,ab OR failure*:ti,ab OR sufficien*:ti,ab OR insufficien*:ti,ab)	426,131
9	esrd:ti,ab OR eskd:ti,ab OR esrf:ti,ab OR ckf:ti,ab OR ckd:ti,ab OR crf:ti,ab OR crd:ti,ab	74,498
10	'kidney diseases*'	44,317
11	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10	1,435,886
12	'health economics'	67,562
13	'economic evaluation' OR 'economic evaluations'	20,185
14	'fee'	41,122
15	'health care cost'	162,806
16	'pharmacoeconomics'	83,685
17	'drug cost'	69,204
18	'cost effectiveness analysis'/exp OR 'cost effectiveness':ab,ti OR cea:ab,ti	172,036
19	cost:ab,ti OR costs:ab,ti OR costing:ab,ti	571,464
20	(cost* NEAR/2 (effective* OR utility* OR benefit* OR minimi*)):ab,ti	169,719
21	economic*:ab,ti OR pharmacoeconomic*:ab,ti	270,676
22	expenditure*:ab,ti NOT energy:ab,ti	32,072
23	(value NEAR/1 money):ab,ti	31
24	budget*:ab,ti	31,385
25	#12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24	1,039,866
26	'energy cost':ab,ti OR 'oxygen cost':ab,ti	3,773
27	'metabolic cost':ab,ti	1,223
28	'energy expenditure':ab,ti OR 'oxygen expenditure':ab,ti	26,595
29	#26 OR #27 OR #28	30,621
30	#25 NOT #29	1,033,711
31	'quality adjusted life year*' OR 'quality-adjusted life year' OR QALY	24,040
32	'incremental cost effectiveness ratio*' OR ICER	10,841
33	'life year' OR 'life-year'	23,104
34	#31 OR #32 OR #33	30,100
35	#30 AND #34	26,532
36	#11 AND #35	1,437
37	'case study'/de OR 'case report' OR 'editorial'/de OR 'comment' OR 'letter'/de OR 'abstract report'/de	3,749,637
38	#36 NOT #37	1,375
39	#38 AND [english]/lim	1,345

**Supplementary Table 3. Cochrane library search terms for studies of health economic models for the simulation of patients with CKD**

#	Search terms	Number of hits
1	MeSH descriptor: [Renal Insufficiency, Chronic] explode all trees	4,700
2	MeSH descriptor: [Kidney Failure, Chronic] explode all trees	3,894
3	MeSH descriptor: [Renal Insufficiency] explode all trees	6,164
4	nephrop* OR kidney OR renal	58,163
5	(endstage OR 'end-stage') AND (renal or kidney*)	3,363
6	proteinuri* OR albuminuri* OR uremia* OR uraemia*	6,127
7	(kidney:ti,ab,kw OR renal:ti,ab,kw) AND (disease*:ti,ab,kw OR failure*:ti,ab,kw OR sufficien*:ti,ab,kw OR insufficien*:ti,ab,kw)	27,417
8	esrd:ti,ab,kw OR eskd:ti,ab,kw OR esrf:ti,ab,kw OR ckf:ti,ab,kw OR ckd:ti,ab,kw OR crf:ti,ab,kw OR crd:ti,ab,kw	4,042
9	'kidney diseases*'	6,677
10	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9	60,111
11	MeSH descriptor: [Health Care Costs] explode all trees	7,438
12	'health economics' OR 'economic evaluation' OR 'drug costs' OR 'cost effectiveness analysis' (Word variations have been searched)	47,441
13	'cost effectiveness' OR 'cost-effectiveness' OR CEA (Word variations have been searched)	37,009
14	cost OR costs OR costing (Word variations have been searched)	71,440
15	'cost effective*' OR 'cost utility*' OR 'cost benefit*' OR 'cost minimi*' OR economic* OR pharmacoeconomic* OR expenditure* NOT energy OR (value AND money) OR budget*	67,678
16	#11 or #12 or #13 or #14 or #15	81,516
17	'energy cost' OR 'oxygen cost' OR 'metabolic cost' OR 'energy expenditure' OR 'oxygen expenditure'	7,094
18	#16 NOT #17	77,091
19	#10 AND #18	4,903
20	'quality adjusted life year*' OR QALY	11,947
21	'incremental cost effectiveness ratio' OR ICER	4,506
22	#20 OR #21	13,683
23	#19 AND #22	1,040

**Supplementary Table 4. EconLit search terms for studies of health economic models for the simulation of patients with CKD**

#	Search terms	Number of hits
1	renal	129
2	kidney disease	53
3	renal disease	71
4	renal failure	28
5	kidney failure	35
6	end stage renal disease	49
7	end stage kidney disease	11
8	chronic renal disease	13
9	chronic kidney failure	5
10	nephropathy	8
11	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10	188

**Supplementary Table 5. Medline (PubMed) search terms for systematic review studies of health economic models for the simulation of patients with diabetes**

#	Search terms	Number of hits
1	Diabetes mellitus [MeSH Terms]	370,272
2	diabet* OR diabetes OR NIDDM OR IDDM OR DM OR "insulin resistance" OR diabetolog*	702,947
3	#1 OR #2	702,947
4	"economics, medical"[MeSH Terms]	13,978
5	"economic evaluation" OR "economic evaluations"	9,798
6	"fee" or "fees"	39,037
7	"health care costs"[MeSH Terms]	56,165
8	"drug costs"[MeSH Terms]	14,173
9	"cost-benefit analysis"[MeSH Terms] OR "cost effectiveness"[Text Word] OR "cost-effectiveness"[Title/Abstract] OR CEA[Title/Abstract]	113,077
10	cost[Title/Abstract] OR costs[Title/Abstract] OR costing[Title/Abstract]	439,149
11	"cost effective*"[Title/Abstract] OR "cost utilit*"[Title/Abstract] OR "cost benefit*"[Title/Abstract] OR "cost minimi*"[Title/Abstract]	81,439
12	economic*[Title/Abstract] OR pharmacoeconomic*[Title/Abstract]	231,540
13	expenditure*[Title/Abstract] NOT energy[Title/Abstract]	24,451
14	value[Title/Abstract] AND money[Title/Abstract]	2,470
15	Budget*[Title/Abstract]	24,807
16	#4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15	726,718
17	#3 AND #16	22,413
18	"quality adjusted life year*" OR "quality-adjusted life year" OR QALY	14,609
19	"incremental cost effectiveness ratio*" OR ICER	5,014
20	"life year" OR "life-year"	6,013
21	#18 OR #19 OR #20	17,789
22	#17 AND #21	961
23	#22 AND systematic [sb]	147
24	#23 AND English [Language]	144

**Supplementary Table 6. Medline (PubMed) search terms for systematic review studies of health economic models for the simulation of patients with hypertension**

#	Search terms	Number of hits
1	Hypertension [MeSH Terms]	235,015
2	Blood Pressure, High OR Blood Pressures, High OR High Blood Pressure OR High Blood Pressures	551,466
3	#1 OR #2	551,466
4	"economics, medical"[MeSH Terms]	13,976
5	"economic evaluation" OR "economic evaluations"	9,753
6	"fee" or "fees"	38892
7	"health care costs"[MeSH Terms]	55976
8	"drug costs"[MeSH Terms]	14135
9	"cost-benefit analysis"[MeSH Terms] OR "cost effectiveness"[Text Word] OR "cost-effectiveness"[Title/Abstract] OR CEA[Title/Abstract]	112,737
10	cost[Title/Abstract] OR costs[Title/Abstract] OR costing[Title/Abstract]	437,362
11	"cost effective"[Title/Abstract] OR "cost utilit"[Title/Abstract] OR "cost benefit"[Title/Abstract] OR "cost minimi"[Title/Abstract]	81,117
12	economic*[Title/Abstract] OR pharmacoeconomic*[Title/Abstract]	230,698
13	expenditure*[Title/Abstract] NOT energy[Title/Abstract]	24,366
14	value[Title/Abstract] AND money[Title/Abstract]	2,461
15	Budget*[Title/Abstract]	24,724
16	#4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15	724,013
17	#3 AND #16	12,605
18	"quality adjusted life year*" OR "quality-adjusted life year" OR QALY	14,540
19	"incremental cost effectiveness ratio*" OR ICER	4,987
20	"life year" OR "life-year"	5,991
21	#18 OR #19 OR #20	17,714
22	#17 AND #21	376
23	#22 AND systematic [sb]	41
24	#23 AND English [Language]	40

**Supplementary Table 7. Eligibility criteria for the identification of studies of health economic models for the simulation of patients with CKD**

	<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
<b>Population</b>	Patients with/without CKD in whom CKD progression is evaluated (refer to Study design) Adults	Children and young people (under 18 years) Animal studies
<b>Intervention and comparators</b>	Not applicable	Not applicable
<b>Outcomes</b>	Model structure to include the progression of kidney disease and any health economic outcome, including (but not restricted to) QALYs, ICERs, LYG or costs	Outcomes of interest not reported
<b>Study design</b>	Economic models that characterise CKD progression Economic evaluation, pharmacoeconomic evaluation, cost-effectiveness study, cost-utility study, cost-benefit study or cost minimisation study	Randomized clinical trial, non-randomized clinical trial, prospective study, longitudinal study, retrospective study, guideline, cohort study, case reports, letter, editorial, retracted
<b>Language restrictions</b>	English language only	Studies published in languages other than English

*CKD: chronic kidney disease; ICER: incremental cost-effectiveness ratio; LYG: life years gained; QALY: quality-adjusted life year.*