

Supplementary Appendix

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Supplementary Appendix S1. Search Strings

PubMed

Data of search: 30/6/2023

| # | Search | Results |
|----|---|---------|
| 1 | "Renal Insufficiency, Chronic"[Mesh] | 134,097 |
| 2 | "Chronic Renal Insufficiencies"[TIAB] OR "Renal Insufficiencies, Chronic"[TIAB] OR "(Chronic Renal Insufficiency"[TIAB] OR "Kidney Insufficiency, Chronic"[TIAB] OR "Chronic Kidney Insufficiency"[TIAB] OR "Chronic Kidney Insufficiencies"[TIAB] OR "Kidney Insufficiencies, Chronic"[TIAB] OR "Chronic Kidney Diseases"[TIAB] OR "Chronic Kidney Disease"[TIAB] OR "Disease, Chronic Kidney"[TIAB] OR "Diseases, Chronic Kidney"[TIAB] OR "Kidney Disease, Chronic"[TIAB] OR "Kidney Diseases, Chronic"[TIAB] OR "Chronic Renal Diseases"[TIAB] OR "Chronic Renal Disease"[TIAB] OR "Disease, Chronic Renal"[TIAB] OR "Diseases, Chronic Renal"[TIAB] OR "Renal Disease, Chronic"[TIAB] OR "Renal Diseases, Chronic"[TIAB] | 82,156 |
| 3 | CKD[TIAB] OR CRD[TIAB] OR "kidney disease*" [tiab] OR "renal disease*" [tiab] | 186,167 |
| 4 | "Diabetic Nephropathies"[Mesh] | 29,441 |
| 5 | "Nephropathies, Diabetic"[TIAB] OR "Nephropathy, Diabetic"[TIAB] OR "Diabetic Nephropathy"[TIAB] OR "Diabetic Kidney Disease"[TIAB] OR "Diabetic Kidney Diseases"[TIAB] OR "Kidney Disease, Diabetic"[TIAB] OR "Kidney Diseases, Diabetic"[TIAB] OR "Diabetic Glomerulosclerosis"[TIAB] OR "Glomerulosclerosis, Diabetic"[TIAB] OR "Intracapillary Glomerulosclerosis"[TIAB] OR "Nodular Glomerulosclerosis"[TIAB] OR "Glomerulosclerosis, Nodular"[TIAB] OR "Kimmelstiel-Wilson Syndrome"[TIAB] OR "Kimmelstiel Wilson Syndrome"[TIAB] OR "Syndrome, Kimmelstiel-Wilson"[TIAB] OR "Kimmelstiel-Wilson Disease"[TIAB] OR "Kimmelstiel Wilson Disease"[TIAB] | 27,049 |
| 6 | "Hypertension, Renal"[Mesh] OR "Hypertensions, Renal"[TIAB] OR "Renal Hypertension"[TIAB] OR "Renal Hypertensions"[TIAB] | 20,135 |
| 7 | "Hypertension, Renal"[Mesh] OR "Renovascular Hypertension"[TIAB] OR "Hypertension, Goldblatt"[TIAB] OR "Goldblatt Hypertension"[TIAB] OR "Goldblatt Syndrome"[TIAB] OR "Syndrome, Goldblatt"[TIAB] | 20,818 |
| 8 | #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 | 297,435 |
| 9 | "Primary Health Care"[Mesh] OR "Care, Primary Health"[TIAB] OR "Health Care, Primary"[TIAB] OR "Primary Healthcare"[TIAB] OR "Healthcare, Primary"[TIAB] OR "Primary Care"[TIAB] OR "Care, Primary"[TIAB] | 280,843 |
| 10 | "Physicians, Primary Care"[Mesh] OR "Physician, Primary Care"[TIAB] OR "Primary Care Physician"[TIAB] OR "Primary Care Physicians"[TIAB] | 24,713 |
| 11 | "Family Practice"[Mesh] OR "Family Practices"[TIAB] OR "Practice, Family"[TIAB] OR "Practices, Family"[TIAB] | 68,339 |
| 12 | "General Practice"[Mesh] OR "Practice, General"[TIAB] | 78,733 |
| 13 | "Community Health Services"[Mesh] OR "Community Health Service"[TIAB] OR "Health Service, Community"[TIAB] OR "Service, Community Health"[TIAB] OR "Services, Community Health"[TIAB] | 334,524 |

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|----|---|---------|
| | OR "Health Services, Community"[TIAB] OR "Community Health Care"[TIAB] OR "Health Care, Community"[TIAB] OR "Community Healthcare"[TIAB] OR "Healthcare, Community"[TIAB] | |
| 14 | "Geriatrics"[Mesh] OR "Gerontology"[TIAB] | 34,339 |
| 15 | "Internal Medicine"[Mesh] OR "Medicine, Internal"[TIAB] OR "General Internal Medicine"[TIAB] OR "Internal Medicine, General"[TIAB] OR "Medicine, General Internal"[TIAB] | 118,434 |
| 16 | #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 | 787,858 |
| 17 | #8 AND #16 | 8,994 |
| 18 | "Telemedicine"[Mesh] | 44,647 |
| 19 | "Tele-Referral"[TIAB] OR "Tele Referral"[TIAB] OR "Tele-Referrals"[TIAB] OR "Virtual Medicine"[TIAB] OR "Medicine, Virtual"[TIAB] OR "Tele-Intensive Care"[TIAB] OR "Tele Intensive Care"[TIAB] OR "Tele-ICU"[TIAB] OR "Tele ICU"[TIAB] OR "Mobile Health"[TIAB] OR "Health, Mobile"[TIAB] OR "mHealth"[TIAB] OR "Telehealth"[TIAB] OR "eHealth"[TIAB] | 35,044 |
| 20 | "digital health"[TIAB] OR "digital health intervention"[TIAB] OR "digital health technology"[TIAB] | 7,583 |
| 21 | "decision support systems, clinical"[MeSH] OR "Clinical Decision Support Systems"[TIAB] OR "Clinical Decision Support System"[TIAB] OR "Clinical Decision Support"[TIAB] OR "Clinical Decision Supports"[TIAB] OR "Decision Supports, Clinical"[TIAB] OR "Support, Clinical Decision"[TIAB] OR "Supports, Clinical Decision"[TIAB] OR "Decision Support, Clinical"[TIAB] | 14,505 |
| 22 | "Artificial Intelligence"[Mesh] OR "Intelligence, Artificial"[TIAB] OR "Computational Intelligence"[TIAB] OR "Intelligence, Computational"[TIAB] OR "Machine Intelligence"[TIAB] OR "Intelligence, Machine"[TIAB] OR "Computer Reasoning"[TIAB] OR "Reasoning, Computer"[TIAB] OR "AI (Artificial Intelligence)"[TIAB] OR "Computer Vision Systems"[TIAB] OR "Computer Vision System"[TIAB] OR "System, Computer Vision"[TIAB] OR "Systems, Computer Vision"[TIAB] OR "Vision System, Computer"[TIAB] OR "Vision Systems, Computer"[TIAB] OR "Knowledge Acquisition (Computer)"[TIAB] OR "Acquisition, Knowledge (Computer)"[TIAB] OR "Knowledge Representation (Computer)"[TIAB] OR "Knowledge Representations (Computer)"[TIAB] OR "Representation, Knowledge (Computer)"[TIAB] | 174,894 |
| 23 | "digital health"[TIAB] OR "online health"[TIAB] OR "weight loss app*"[TIAB] OR "weight reduction app*"[TIAB] OR "weight management app*"[TIAB] OR "lipid monitoring app*"[TIAB] OR "lipid management app*"[TIAB] OR "glucose monitoring app*"[TIAB] OR "glucose management app*"[TIAB] OR "health monitoring app*"[TIAB] OR "lifestyle app*"[TIAB] OR "diabetes management app*"[TIAB] OR "hypertension management app*"[TIAB] OR "blood pressure management app*"[TIAB] OR "blood pressure monitoring app*"[TIAB] | 10,547 |
| 24 | "Electronic Health Records"[MeSH] OR "electronic health record*"[tiab] OR "personal health record*"[tiab] OR "electronic medical record*"[tiab] OR "EMR"[tiab] OR "EHR"[tiab] OR "Health Records, Personal"[MeSH] OR "Computer Security"[Mesh] OR "data security"[tiab] OR "cybersecurity"[tiab] OR "cyber security"[tiab] OR "data protect*"[tiab] OR "data encrypt*"[tiab] OR "Cloud Computing"[Mesh] OR "cloud computing"[tiab] OR "cloud process*"[tiab] OR "cognitive comput*"[tiab] OR "Patient Portals"[Mesh] OR "patient web portal*"[tiab] OR "patient web- | 565,280 |

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|----|--|-----------|
| | portal*[tiab] OR "patient portal"[tiab] OR "web portal"[tiab] OR "Health Information Exchange"[MeSH] OR "health information exchange"[tiab] OR "electronic health information"[tiab] OR "electronic health communication"[tiab] OR "health information interoperability"[MeSH] OR "interoperability" OR "patient monitor"[tiab] OR "wearables"[tiab] OR "activity monitor"[tiab] OR "sensor"[tiab] OR "physiologic monitoring"[MeSH] OR "physiologic monitoring"[tiab] | |
| 25 | "Machine Learning"[MeSH] OR "machine learning"[tiab] OR "machine-learning"[tiab] OR "natural language processing"[tiab] OR "neural network"[tiab] OR "quantified self"[tiab] OR "connected health"[tiab] OR "big data"[tiab] OR "gamification"[tiab] OR "social media"[tiab] OR "health 2.0"[tiab] OR "personalized genomics"[tiab] OR "precision medicine"[tiab] OR "precision medicine"[MeSH] OR "individualized medicine"[tiab] OR "internet of things"[tiab] OR "IoT"[tiab] OR "IOT"[tiab] OR ("social program"[tiab] OR "care manage"[tiab] OR "coordinate* care"[tiab] OR "health benefit"[tiab] OR insur*[tiab]) AND "digital"[tiab]) | 279,874 |
| 26 | #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 | 959,194 |
| 27 | #17 AND #26 | 528 |
| 28 | #17 AND #26 | 257 |
| 29 | #17 AND #26 | 252 |
| 30 | #17 AND #26 | 244 |
| 31 | "Clinical Trial" [Publication Type] OR "Clinical Trials as Topic"[Mesh] OR "Controlled Clinical Trial" [Publication Type] OR "Pragmatic Clinical Trial" [Publication Type] OR "Clinical Trial, Phase IV" [Publication Type] OR "Clinical Trial, Phase III" [Publication Type] OR "Clinical Trial, Phase II" [Publication Type] OR "Clinical Trial, Phase I" [Publication Type] OR "Clinical Trial Protocols as Topic"[Mesh] OR "Clinical Trial Protocol" [Publication Type] OR "Adaptive Clinical Trial" [Publication Type] | 1,276,642 |
| 32 | clinical[tiab] or trial*[tiab] or random*[tiab] | 5,721,841 |
| 33 | #31 or #32 | 6,110,555 |
| 34 | #30 and #33 | 129 |

Embase

Data of search: 30/6/2023

| # | Search | Results |
|---|---|---------|
| 1 | 'chronic kidney failure'/exp | 202284 |
| 2 | 'chronic kidney disease':ti,ab,kw OR 'chronic kidney disorder':ti,ab,kw OR 'chronic kidney insufficiency':ti,ab,kw OR 'chronic nephropathy':ti,ab,kw OR 'chronic renal disease':ti,ab,kw OR 'chronic renal failure':ti,ab,kw OR 'chronic renal insufficiency':ti,ab,kw OR 'kidney chronic failure':ti,ab,kw OR 'kidney disease, chronic':ti,ab,kw OR 'kidney failure, chronic':ti,ab,kw OR 'idney function, chronic disease':ti,ab,kw OR 'renal insufficiency, chronic':ti,ab,kw OR 'chronic kidney failure':ti,ab,kw | 164239 |
| 3 | ckd:ti,ab,kw OR crd:ti,ab,kw | 90336 |
| 4 | 'diabetic nephropathy'/exp | 54695 |
| 5 | 'diabetes nephropathy':ti,ab,kw OR 'diabetic glomerulopathy':ti,ab,kw OR | 40485 |

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|----|---|-------------|
| | 'diabetic glomerulosclerosis':ti,ab,kw OR 'diabetic intercapillary glomerulosclerosis':ti,ab,kw OR 'diabetic kidney disease':ti,ab,kw OR 'diabetic nephropathies':ti,ab,kw OR 'diabetic nephrosclerosis':ti,ab,kw OR 'glomerulonecrosis, intercapillary':ti,ab,kw OR 'glomerulosclerosis, diabetic':ti,ab,kw OR 'glomerulosclerosis, intercapillary':ti,ab,kw OR 'intercapillary glomerulosclerosis':ti,ab,kw OR 'kimmelstiehl wilson syndrome':ti,ab,kw OR 'kimmelstiel wilson disease':ti,ab,kw OR 'kimmelstiel wilson nephropathy':ti,ab,kw OR 'kimmelstiel wilson syndrome':ti,ab,kw OR 'nephropathy, diabetic':ti,ab,kw OR 'diabetic nephropathy':ti,ab,kw | |
| 6 | 'renovascular hypertension'/exp OR 'goldblatt hypertension':ti,ab,kw OR 'goldblatt kidney':ti,ab,kw OR 'hypertension, goldblatt':ti,ab,kw OR 'hypertension, renal':ti,ab,kw OR 'hypertension, renovascular':ti,ab,kw OR 'juxtaglomerular hypertension':ti,ab,kw OR 'kidney hypertension':ti,ab,kw OR 'kidney vascular hypertension':ti,ab,kw OR 'nephrogenic hypertension':ti,ab,kw OR 'nephrogenous hypertension':ti,ab,kw OR 'renal hypertension':ti,ab,kw OR 'renal vascular hypertension':ti,ab,kw OR 'renoarterial hypertension':ti,ab,kw OR 'renovascular hypertension':ti,ab,kw | 27810 |
| 7 | #1 OR #2 OR #3 OR #4 OR #5 OR #6 | 335969 |
| 8 | 'primary health care'/exp | 206278 |
| 9 | 'first line care':ti,ab,kw OR 'health care, primary':ti,ab,kw OR 'primary care nursing':ti,ab,kw OR 'primary healthcare':ti,ab,kw OR 'primary nursing care':ti,ab,kw OR 'primary health care':ti,ab,kw | 48255 |
| 10 | 'general practitioner'/exp OR 'family doctor':ti,ab,kw OR 'family physician':ti,ab,kw OR 'family physicians':ti,ab,kw OR 'family practitioner':ti,ab,kw OR 'general physician':ti,ab,kw OR 'general practice physician':ti,ab,kw OR 'general practitioners':ti,ab,kw OR 'gp (general practitioner)':ti,ab,kw OR 'physicians, family':ti,ab,kw OR 'physicians, primary care':ti,ab,kw OR 'practitioner, general':ti,ab,kw OR 'primary care doctor':ti,ab,kw OR 'primary care physician':ti,ab,kw OR 'primary care physicians':ti,ab,kw OR 'general practitioner':ti,ab,kw | 181017 |
| 11 | 'general practice'/exp OR 'family practice':ti,ab,kw OR 'general medical practice':ti,ab,kw OR 'general medicine':ti,ab,kw OR 'general practice':ti,ab,kw | 120750 |
| 12 | 'primary medical care'/exp OR 'medical care, primary':ti,ab,kw OR 'primary care':ti,ab,kw OR 'primary medical care':ti,ab,kw | 229423 |
| 13 | 'community care'/exp OR 'community care service':ti,ab,kw OR 'community health action':ti,ab,kw OR 'community health care':ti,ab,kw OR 'community health service':ti,ab,kw OR 'community health services':ti,ab,kw OR 'community networks':ti,ab,kw OR 'religious missions':ti,ab,kw OR 'uncompensated care':ti,ab,kw OR 'community care':ti,ab,kw | 145771 |
| 14 | 'internal medicine'/exp OR 'medicine, internal':ti,ab,kw OR 'internal medicine':ti,ab,kw | 354147 |
| 15 | 'geriatrics'/exp OR 'geriatric aspects':ti,ab,kw OR 'geriatric medicine':ti,ab,kw OR 'geriatric practice':ti,ab,kw OR 'geriatry':ti,ab,kw OR 'sociogeriatrics':ti,ab,kw OR 'geriatrics':ti,ab,kw | 74031 |
| 16 | #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 | 100213 3 |
| 17 | 'telehealth'/exp | 85023 |
| 18 | 'e-health':ti,ab,kw OR 'ehealth':ti,ab,kw OR 'tele-health':ti,ab,kw OR 'telehealth':ti,ab,kw | 29380 |
| 19 | 'digital health':ti,ab,kw OR 'digital health intervention':ti,ab,kw OR 'digital | 7650 |

| | | |
|----|---|--------|
| | health technology':ti,ab,kw | |
| 20 | 'clinical decision support system'/exp OR 'cds system (clinical decision support system)':ti,ab,kw OR 'clinical decision support (cds) system':ti,ab,kw OR 'clinical decision support systems':ti,ab,kw OR 'clinician decision support system':ti,ab,kw OR 'decision support systems, clinical':ti,ab,kw OR 'clinical decision support system':ti,ab,kw | 7836 |
| 21 | 'artificial intelligence'/exp OR 'machine intelligence':ti,ab,kw OR 'artificial intelligence':ti,ab,kw | 88763 |
| 22 | 'mhealth':ti,ab,kw OR 'mobile health':ti,ab,kw OR 'health app*':ti,ab,kw OR 'digital health':ti,ab,kw OR 'online health':ti,ab,kw OR 'weight loss app*':ti,ab,kw OR 'weight reduction app*':ti,ab,kw OR 'weight management app*':ti,ab,kw OR 'lipid monitoring app*':ti,ab,kw OR 'lipid management app*':ti,ab,kw OR 'glucose monitoring app*':ti,ab,kw OR 'glucose management app*':ti,ab,kw OR 'health monitoring app*':ti,ab,kw OR 'lifestyle app*':ti,ab,kw OR 'diabetes management app*':ti,ab,kw OR 'hypertension management app*':ti,ab,kw OR 'blood pressure management app*':ti,ab,kw OR 'blood pressure monitoring app*':ti,ab,kw | 33719 |
| 23 | #17 OR #18 OR #19 OR #20 OR #21 OR #22 | 210953 |
| 24 | #7 AND #16 | 18166 |
| 25 | #23 AND #24 | 365 |
| 26 | #25 AND ([adult]/lim OR [aged]/lim) | 204 |
| 27 | #25 AND ([adult]/lim OR [aged]/lim) AND [english]/lim | 204 |
| 28 | #27 AND (2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR 2015:py OR 2016:py OR 2017:py OR 2018:py OR 2019:py OR 2020:py OR 2021:py OR 2022:py OR 2023:py) | 202 |
| 29 | #28 AND ('clinical protocol'/de OR 'clinical trial'/de OR 'clinical trial topic'/de OR 'comparative effectiveness'/de OR 'comparative study'/de OR 'controlled study'/de OR 'intervention study'/de OR 'pragmatic trial'/de OR 'randomized controlled trial'/de OR 'randomized controlled trial topic'/de) | 123 |

Cochrane

Data of search: 30/6/2023

| # | Search | Results |
|---|---|---------|
| 1 | MeSH descriptor: [Renal Insufficiency, Chronic] explode all trees | 8588 |
| 2 | (Renal Insufficiency, Chronic OR Diseases, Chronic Kidney OR Disease, Chronic Renal OR Disease, Chronic Kidney OR Chronic Renal Disease OR Kidney Disease, Chronic OR Diseases, Chronic Renal OR Chronic Renal Diseases OR Chronic Kidney Disease OR Kidney Diseases, Chronic OR Renal Disease, Chronic OR Renal Diseases, Chronic OR Chronic Kidney Diseases OR Chronic Renal Insufficiency OR Chronic Kidney Insufficiencies OR Kidney Insufficiency, Chronic OR Renal Insufficiencies, Chronic OR Chronic Renal Insufficiencies OR Kidney Insufficiencies, Chronic OR Chronic Kidney Insufficiency):ti,ab,kw | 19301 |
| 3 | (CKD OR CRD):ti,ab,kw | 7817 |
| 4 | MeSH descriptor: [Diabetic Nephropathies] explode all trees | 1793 |
| 5 | (Diabetic Nephropathies OR Diabetic Glomerulosclerosis OR Glomerulosclerosis, Diabetic OR Kimmelstiel-Wilson Syndrome OR Kimmelstiel-Wilson Disease OR Glomerulosclerosis, Nodular OR Nodular Glomerulosclerosis OR Kimmelstiel Wilson Disease OR Intracapillary Glomerulosclerosis OR Kimmelstiel Wilson Syndrome OR Syndrome, Kimmelstiel-Wilson OR Kidney Disease, Diabetic OR Kidney Diseases, Diabetic OR Diabetic Kidney Diseases OR Nephropathy, Diabetic OR Nephropathies, Diabetic OR Diabetic Kidney Disease OR Diabetic | 6684 |

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|----|--|------------|
| | Nephropathy):ti,ab,kw | |
| 6 | #1 OR #2 OR #3 OR #4 OR #5 | 28046 |
| 7 | MeSH descriptor: [Telemedicine] explode all trees | 4250 |
| 8 | (Telemedicine OR Virtual Medicine OR Medicine, Virtual OR Tele-Referrals OR Tele-Referral OR Tele Referral OR Health, Mobile OR mHealth OR Mobile Health OR Telehealth OR eHealth OR Tele-ICU OR Tele Intensive Care OR Tele-Intensive Care OR Tele ICU):ti,ab,kw | 17314 |
| 9 | MeSH descriptor: [Decision Support Systems, Clinical] explode all trees | 563 |
| 10 | (Decision Support Systems, Clinical OR Clinical Decision Support Systems OR Clinical Decision Support System OR Clinical Decision Support OR Clinical Decision Supports OR Decision Supports, Clinical OR Support, Clinical Decision OR Supports, Clinical Decision OR Decision Support, Clinical):ti,ab,kw | 6176 |
| 11 | MeSH descriptor: [Artificial Intelligence] explode all trees | 2883 |
| 12 | (Artificial Intelligence OR Machine Intelligence OR Intelligence, Artificial OR Computer Reasoning OR AI (Artificial Intelligence) OR Intelligence, Computational OR Intelligence, Machine OR Reasoning, Computer OR Computational Intelligence OR Knowledge Acquisition (Computer) OR Acquisition, Knowledge (Computer) OR Representation, Knowledge (Computer) OR Knowledge Representation (Computer) OR Knowledge Representations (Computer) OR Vision System, Computer OR Systems, Computer Vision OR Vision Systems, Computer OR Computer Vision System OR Computer Vision Systems OR System, Computer Vision):ti,ab,kw | 2360 |
| 13 | (health app* OR digital health OR online health OR weight loss app* OR weight reduction app* OR weight management app* OR lipid monitoring app* OR lipid management app* OR glucose monitoring app* OR glucose management app* OR health monitoring app* OR lifestyle app* OR diabetes management app* OR hypertension management app* OR blood pressure management app* OR blood pressure monitoring app* OR teledietetics OR telediet* OR smartphone*):ti,ab,kw | 14463 4 |
| 14 | #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 | 15955 7 |
| 15 | MeSH descriptor: [Primary Health Care] explode all trees | 10333 |
| 16 | (Primary Health Care OR Care, Primary OR Primary Care OR Healthcare, Primary OR Care, Primary Health OR Health Care, Primary OR Primary Healthcare):ti,ab,kw | 117852 |
| 17 | MeSH descriptor: [General Practice] explode all trees | 3038 |
| 18 | MeSH descriptor: [Family Practice] explode all trees | 2243 |
| 19 | MeSH descriptor: [Physicians, Family] explode all trees | 510 |
| 20 | MeSH descriptor: [Community Health Services] explode all trees | 18483 |
| 21 | (Family Practice OR Practice, Family OR Family Practices OR Practices, Family OR General Practice OR Practice, General OR Physicians, Family OR Family Physician OR Physician, Family OR Family Physicians OR Community Health Services OR Community Health Care OR Healthcare, Community OR Health Care, Community OR Community Healthcare OR Community Health Service OR Health Service, Community OR Health Services, Community OR Service, Community Health OR Services, Community Health):ti,ab,kw | 46202 |
| 22 | #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 | 15947 9 |
| 23 | #14 AND #22 | 48277 |
| 24 | #6 AND #23 | 865 |

| | | |
|----|--|--------|
| 25 | #6 AND #23 with Publication Year from 2009 to present, in Trials | 777 |
| 26 | (adult* OR elder*):ti,ab,kw | 843987 |
| 27 | (Child* OR adolesc* OR teen*):ti,ab,kw | 295224 |
| 28 | #26 NOT #27 | 700059 |
| 29 | #25 AND #28 | 328 |

Web of Science

Data of search: 30/6/2023

| # | Search | Results |
|----|---|---------|
| 1 | TS=(Chronic Renal Disease OR Chronic Renal Diseases OR Chronic Kidney Disease OR Chronic Kidney Diseases OR Chronic Renal Insufficiency OR Chronic Kidney Insufficiencies OR Chronic Renal Insufficiencies OR Chronic Kidney Insufficiency OR CKD OR CRD) | 336844 |
| 2 | TS=(Diabetic Nephropathies OR Diabetic Glomerulosclerosis OR Kimmelstiel-Wilson Syndrome OR Kimmelstiel-Wilson Disease OR Nodular Glomerulosclerosis OR Kimmelstiel Wilson Disease OR Intracapillary Glomerulosclerosis OR Kimmelstiel Wilson Syndrome OR Diabetic Kidney Diseases OR Diabetic Kidney Disease OR Diabetic Nephropathy) | 99195 |
| 3 | #1 OR #2 | 407650 |
| 4 | TS=(Telemedicine OR Virtual Medicine OR Tele-Referrals OR Tele-Referral OR Tele Referral OR mHealth OR Mobile Health OR Telehealth OR eHealth OR Tele-ICU OR Tele Intensive Care OR Tele-Intensive Care OR Tele ICU) | 203623 |
| 5 | TS=(Clinical Decision Support Systems OR Clinical Decision Support System OR Clinical Decision Support OR Clinical Decision Supports) | 83355 |
| 6 | TS=(Artificial Intelligence OR Machine Intelligence OR Computer Reasoning OR AI (Artificial Intelligence) OR Computational Intelligence OR Knowledge Acquisition (Computer) OR Knowledge Representation (Computer) OR Knowledge Representations (Computer) OR Computer Vision System OR Computer Vision Systems) | 1189467 |
| 7 | TS=(health app* OR digital health OR online health OR weight loss app* OR weight reduction app* OR weight management app* OR lipid monitoring app* OR lipid management app* OR glucose monitoring app* OR glucose management app* OR health monitoring app* OR lifestyle app* OR diabetes management app* OR hypertension management app* OR blood pressure management app* OR blood pressure monitoring app* OR teledietetics OR telediet* OR smartphone*) | 3413112 |
| 8 | #4 OR #5 OR #6 OR #7 | 4684475 |
| 9 | TS=(Primary Health Care OR Primary Care OR Primary Healthcare OR Family Practice OR Family Practices OR General Practice OR Family Physician OR Family Physicians OR Community Health Services OR Community Health Care OR Community Healthcare OR Community Health Service) | 1704671 |
| 10 | #8 and #9 | 450799 |
| 11 | #3 and #10 | 4917 |
| 12 | #3 and #10 and 2010 OR 2009 OR 2011 OR 2012 OR 2013 OR 2014 OR | 4005 |

| | | |
|----|---|---------|
| | 2015 OR 2016 OR 2017 OR 2018 OR 2019 OR 2020 OR 2021 OR 2022 OR 2023 (Publication Year) | |
| 13 | #3 and #10 and 2010 OR 2009 OR 2011 OR 2012 OR 2013 OR 2014 OR 2015 OR 2016 OR 2017 OR 2018 OR 2019 OR 2020 OR 2021 OR 2022 OR 2023 (Publication Year) and Clinical Trial (Publication Type) | 215 |
| 14 | #3 and #10 and 2010 OR 2009 OR 2011 OR 2012 OR 2013 OR 2014 OR 2015 OR 2016 OR 2017 OR 2018 OR 2019 OR 2020 OR 2021 OR 2022 OR 2023 (Publication Year) and Clinical Trial (Publication Type) and English (Language) | 214 |
| 15 | TS=(adult* OR elder*) | 8664916 |
| 16 | TS=(Child* OR adolesc* OR teen*) | 5800848 |
| 17 | #15 not #16 | 6204065 |
| 18 | #14 and #17 | 87 |

ClinicalTrials.gov

Data of search: 30/6/2023

| | Search | Results |
|------------------------|---|---------|
| Condition OR disease | Renal Insufficiency, Chronic OR Diseases, Chronic Kidney OR Disease, Chronic Renal OR Disease, Chronic Kidney OR Chronic Renal Disease OR Kidney Disease, Chronic OR Diseases, Chronic Renal OR Chronic Renal Diseases OR Chronic Kidney Disease OR Kidney Diseases, Chronic OR Renal Disease, Chronic OR Renal Diseases, Chronic OR Chronic Kidney Diseases OR Chronic Renal Insufficiency OR Chronic Kidney Insufficiencies OR Kidney Insufficiency, Chronic OR Renal Insufficiencies, Chronic OR Chronic Renal Insufficiencies OR Kidney Insufficiencies, Chronic OR Chronic Kidney Insufficiency OR CKD OR CRD OR Diabetic Nephropathies OR Diabetic Glomerulosclerosis OR Glomerulosclerosis, Diabetic OR Kimmelstiel-Wilson Syndrome OR Kimmelstiel-Wilson Disease OR Glomerulosclerosis, Nodular OR Nodular Glomerulosclerosis OR Kimmelstiel Wilson Disease OR Intracapillary Glomerulosclerosis OR Kimmelstiel Wilson Syndrome OR Syndrome, Kimmelstiel-Wilson OR Kidney Disease, Diabetic OR Kidney Diseases, Diabetic OR Diabetic Kidney Diseases OR Nephropathy, Diabetic OR Nephropathies, Diabetic OR Diabetic Kidney Disease OR Diabetic Nephropathy | |
| Intervention/Treatment | Telemedicine OR Virtual Medicine OR Medicine, Virtual OR Tele-Referrals OR Tele-Referral OR Tele Referral OR Health, Mobile OR mHealth OR Mobile Health OR Telehealth OR eHealth OR Tele-ICU OR Tele Intensive Care OR Tele-Intensive Care OR Tele ICU OR Decision Support Systems, Clinical OR Clinical Decision Support Systems OR Clinical Decision Support System OR Clinical Decision Support OR Clinical Decision Supports OR Decision Supports, Clinical OR Support, Clinical | |

| | | |
|---------------|--|---|
| | Decision OR Supports, Clinical Decision OR Decision Support, Clinical OR Artificial Intelligence OR Machine Intelligence OR Intelligence, Artificial OR Computer Reasoning OR AI (Artificial Intelligence) OR Intelligence, Computational OR Intelligence, Machine OR Reasoning, Computer OR Computational Intelligence OR Knowledge Acquisition (Computer) OR Acquisition, Knowledge (Computer) OR Representation, Knowledge (Computer) OR Knowledge Representation (Computer) OR Knowledge Representations (Computer) OR Vision System, Computer OR Systems, Computer Vision OR Vision Systems, Computer OR Computer Vision System OR Computer Vision Systems OR System, Computer Vision OR health app* OR digital health OR online health OR weight loss app* OR weight reduction app* OR weight management app* OR lipid monitoring app* OR lipid management app* OR glucose monitoring app* OR glucose management app* OR health monitoring app* OR lifestyle app* OR diabetes management app* OR hypertension management app* OR blood pressure management app* OR blood pressure monitoring app* OR teledietetics OR telediet* OR smartphone* | |
| Age | Adults | |
| Study type | Interventional | |
| Study results | With results | |
| | | 2 |

Supplementary Appendix S2. Reference List of Included Studies

1. Abdel-Kader, K., et al., *Automated clinical reminders for primary care providers in the care of CKD: a small cluster-randomized controlled trial*. Am J Kidney Dis, 2011. **58**(6): p. 894-902.
2. Bhardwaja, B., et al., - *Improving Prescribing Safety in Patients with Renal Insufficiency in the Ambulatory Setting: The Drug Renal Alert Pharmacy (DRAP) Program*. 2011. - **31**(- 4): p. - 356.
3. Blakeman, T., et al., *Effect of information and telephone-guided access to community support for people with chronic kidney disease: randomised controlled trial*. PLoS One, 2014. **9**(10): p. e109135.
4. Humalda, J.K., et al., *A Self-management Approach for Dietary Sodium Restriction in Patients With CKD: a Randomized Controlled Trial*. American journal of kidney diseases, 2020. **75**(6): p. 847-856.
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Supplementary Table S1. Eligibility Criteria for Study Inclusion

| | Inclusion | Exclusion |
|------------------|-------------------------------------|--|
| Participant | Adults with chronic kidney disease | Patients on dialysis with CKD and patients without CKD |
| Intervention | Digital health intervention | Without digital health intervention |
| Comparator | Usual or standard care | Comparators that incorporated digital health intervention |
| Outcome | Report improvements in desired care | Not reporting improvements in desired care |
| Study design | Clinical trials | Observational, cross-sectional, pre/post, case studies, case series, case-control, systematic reviews, meta-analysis |
| Language | English | Non-English |
| Published date | 2009 to 30/6/2023 | Before 2009 |
| Publication type | Research article reporting findings | Conference abstract, protocol, commentary, animal study, unpublished literature, retracted articles |

CKD: chronic kidney disease

Supplementary Table S2. Characteristics of Included Studies

| Study ID, Country | Users of Interventions | Types of interventions | Study design | Total no. of patients (no. of clusters) | Comparator | Outcomes | |
|---------------------------------|------------------------|---|--------------|---|---------------------------|--|---|
| | | | | | | primary | secondary |
| Abdel-Kader 2011, the US | primary care providers | Automated Clinical Reminders | cluster RCT | 248 (30) | usual care with education | referral to a nephrologist | albuminuria/proteinuria assessment, CKD documentation, optimal blood pressure, use of renoprotective medications |
| Bhardwaja 2011, the US | providers (pharmacist) | Clinical Decision Support | RCT | 6125 | usual care | the proportion of medication errors | RE-AIM |
| Blakeman 2014, the UK | patients | an intervention to provide information and telephone-guided access to community support | RCT | 436 | usual care | health related quality of life (EQ-5D health questionnaire), BP control, positive and active engagement in life (heiQ) at 6 months | an additional five domains of the heiQ , SDSCA, HADS-A, BIPQ, four physical and psychological well-being health education outcome , cost-effectiveness analysis |

| | | | | | | | |
|--------------------------------------|----------|--------------------|----------------------------|-----|--------------|--|---|
| Humalda 2020, the Netherlands | patients | web-based | RCT | 94 | routine care | sodium excretion after the 3-month intervention and after the 6-month maintenance period | blood pressure, proteinuria, costs, quality of life, self-management skills, and barriers and facilitators for implementation |
| Navaneethan 2017, the US | patients | PHR, alerts CKD | RCT (2*2 factorial design) | 107 | usual care | Δ eGFR over the 2-year study period | acquisition of appropriate laboratory measures (hemoglobin [Hb], phosphorus, 25-hydroxy vitamin D, parathyroid hormone, LDL cholesterol, HbA1c, and urine albumin-to-creatinine ratio); prescription of renoprotective medications, such as angiotensin-converting enzyme inhibitors(ACEIs) and angiotensin receptor blockers (ARBs); referral rates to nephrologists and vascular surgeons and for kidney transplantation assessment; achieving BP control (<130/80 mmHg); number of hospitalizations and emergency room visits; death |

| | | | | | | | |
|-----------------------------|------------------------|------------------------------------|-------------|----------|------------|---|---|
| Peralta 2020, the US | primary care providers | eCDSS with (pharmacist counseling) | cluster RCT | 353 (52) | usual care | Δ blood pressure over 12 months | PCP awareness of CKD, use of ACEi/ARB and statin |
| Rifkin 2013, the US | patients | telemonitoring, wireless device | RCT | 43 | usual care | improved data exchange and device acceptability | BP change |
| Samal 2022, the US | providers & clinics | CDS application | block RCT | 5590 | usual care | Urine and serum laboratory monitoring test findings measured at one timepoint 6 months after the initial primary care visit | nephrology referral in patients at one timepoint 6 months after the initial primary care visit. |

| | | | | | | | |
|--------------------------------|-----------------------|--|--------------------|------------|--|---|--|
| Sarker 2022, Bangladesh | patients | mHealth education | parallel-group RCT | 126 | standard treatment | the evaluation of improved scores on the CKD knowledge questionnaire | QOL and changes in the levels of blood pressure (BP), BMI, serum creatinine, fasting blood sugar (FBS), hemoglobin, cholesterol, high-density lipoprotein cholesterol, triglyceride, serum uric acid, blood urea nitrogen (BUN), and albumin-to-creatinine ratio |
| Sequist 2018, the US | physicians & patients | EHR tools (Alerts) & patient engagement (educational mailings) | Cluster RCT | 7691 (153) | no EHR alerts & no mailed outreach program | high-risk patients: an office visit to a nephrologist and the prescription of ACEI/ARB during the 12-month study period Low-risk patients: the presence of urine protein test during the 12-month study period and the prescription of ACEI/ARB | rates of annual serum creatinine, LDL cholesterol, hemoglobin, phosphorus, 25-OH vitamin D, calcium, and parathyroid hormone testing. |

| | | | | | | | |
|--|-----------|----------------------------|-------------------------------------|--------------|---|----------------------|--|
| St-Jules 2023, the US | patients | mobile self- monitoring | RCT (2*2 factorial design) | 128 | ADVICE group (monthly education handouts) | height and weight | SBP, DBP, and carotid-femoral pulse wave velocity (cf-PWV) blood samples (HbA1c, TC, triglycerides, HDLc, and derived LDLc) |
| vanGelder 2017, the Netherlands | providers | Web-based consultation | cluster RCT | 3004 (47) | enhanced usual care | referral rate | consultation rates, QoC, Process indicators disease progression (assessment of eGFR or serum creatinine, albuminuria, glucose and blood pressure); (2) metabolic parameters [assessment of hemoglobin, calcium, phosphate, parathyroid hormone (PTH), serum albumin and potassium]; costs; questionnaires |

CKD: chronic kidney disease; RE-AIM: reach, effectiveness, adoption, implementation, maintenance; SDSCA: the Summary of Diabetes SelfCare Activities Measure; HADS-A: Hospital Anxiety and Depression Scale; BIPQ: Brief Illness Perception Questionnaire; PHR: personal health records; LDL: Low Density Lipoprotein; HbA1c: hemoglobin A1c; BMI: body mass index; eGFR: estimated glomerular filtration rate; mHealth: mobile health; CDSS: clinical decision support system; EHR: electronic health records; QOL: quality of life; QoC: quality of care; PCP: primary care practitioner; ACEI: angiotensin-converting enzyme inhibitor; ARB: angiotensin receptor blocker.

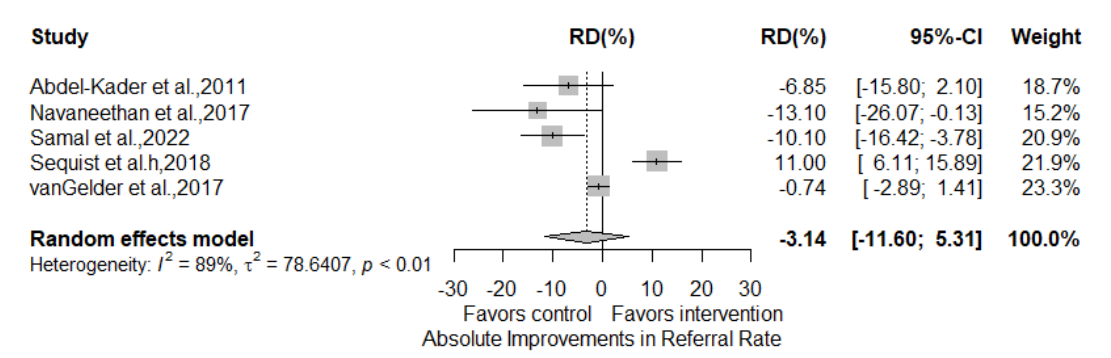
Supplementary Figure S1. Risk of Bias Report of Included Studies

| RCT | D1a | D1b | D2 | D3 | D4 | D5 | Overall | |
|--------------------|------------|------------|-----------|-----------|-----------|-----------|----------------|---------------|
| Bhardwaja (2011) | + | | + | + | + | + | + | Low risk |
| Blakeman (2014) | ! | | + | + | - | + | - | High risk |
| Humalda (2020) | + | | + | + | ! | + | ! | Some concerns |
| Navaneethan (2017) | + | | + | + | + | + | + | Low risk |
| Rifkin (2013) | + | | ! | + | ! | + | ! | Some concerns |
| Samal (2022) | + | | - | + | ! | - | - | High risk |
| Sarker (2022) | + | | + | + | ! | + | ! | Some concerns |
| St-Jules (2023) | ! | | - | + | + | + | - | High risk |
| cluster RCT | | | | | | | | |
| Abdel-Kader (2011) | + | + | + | + | + | + | + | Low risk |
| Peralta (2020) | ! | + | + | + | + | + | ! | Some concerns |
| Sequist (2018) | ! | + | ! | + | + | + | ! | Some concerns |
| vanGelder (2017) | + | + | ! | + | + | + | + | Low risk |

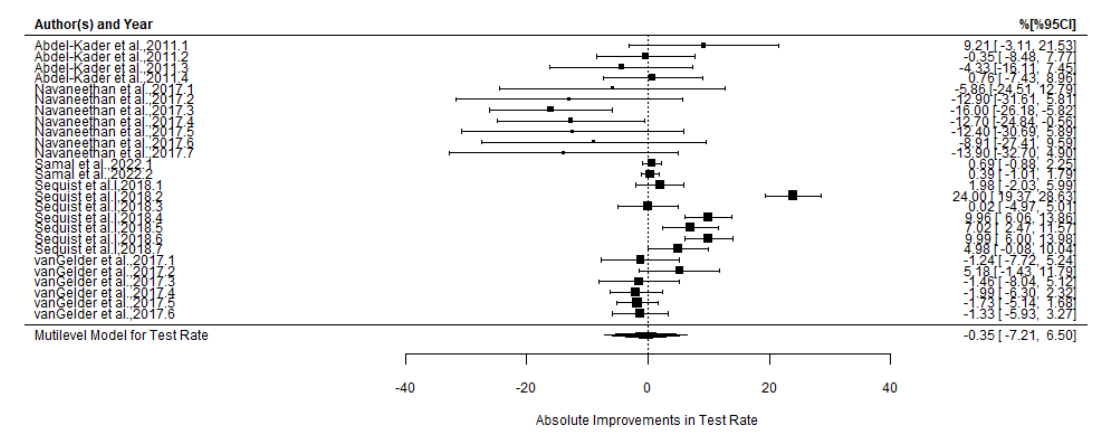
Risk of bias report of included studies using Cochrane's Rob2.

RCT=randomised clinical trials; D1a=Randomisation process;
D1b=Timing of identification or recruitment of participants;
D2=Deviations from the intended interventions; D3=Missing outcome data;
D4=Measurement of the outcome; D5=Selection of the reported result.

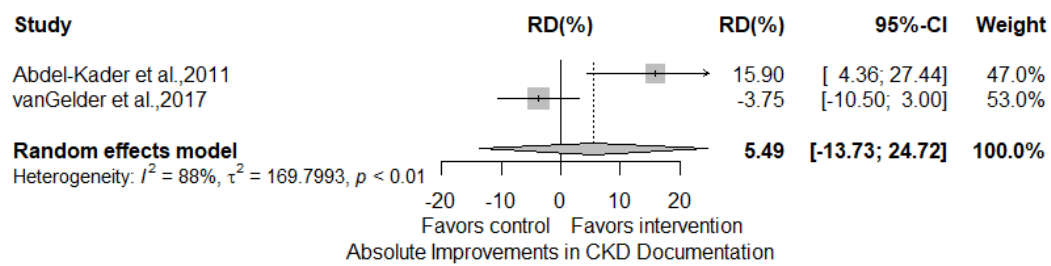
Supplrmntary Figure S2a. Abosolute Improvements in Referral Rate.



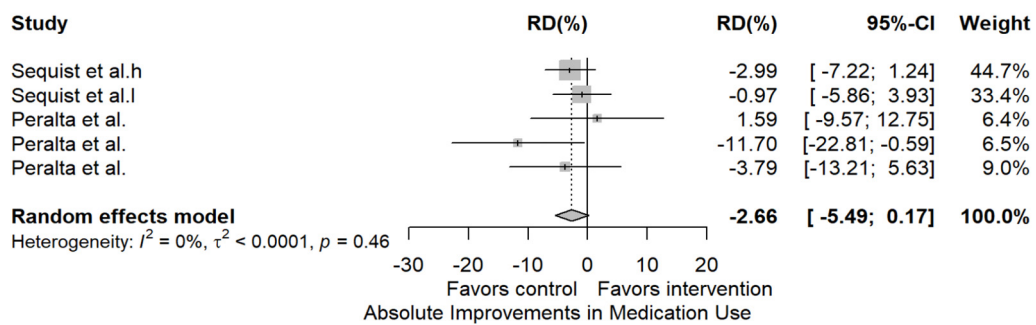
Supplementary Figure S2b. Abosolute Improvements in Test Rate



Supplementary Figure S2c. Absolute Improvements in CKD Documentation



Supplementary Figure S2d. Absolute Improvements in Medication Use



Supplementary Figure S2e. Absolute Improvement of processes of care

