



# **Final Report: Telehealth Work Package B**

**Prepared for the Commonwealth Department of  
Health and Aged Care, Canberra**

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Prepared by:  
**Anna Mae Scott, Tiffany Atkins, Mina Bakhit,  
Hannah Greenwood, Justin Clark, Oyuka Byambasuren, Paul Glasziou**

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## Executive Summary

### Introduction

The uptake of telehealth by Australians has been considerable, representing 17.2% of all consultations in 2022. By provider, in 2022, telehealth consultations represented: 21.9% of all GP consultations, 13.7% of specialist consultations, 27.1% of mental health consultations, 28.3% of nurse practitioner consultations and 14.5% of allied health consultations.(1)

In October 2020, The Institute for Evidence-Based Healthcare was contracted by the then-Department of Health, to complete a review of the evidence for the effectiveness, safety and economic impacts of the provision of primary and allied healthcare via telehealth. The Institute completed the Review in February 2021. Since that Review, over two years of additional evidence on the effectiveness and safety of telehealth has been published. The present Telehealth Review therefore aims both to update the findings of the previous review, to expand its scope with several topics identified as of interest by the Department, and to report the findings across two reports – the report for Work Package A (separate report) and the report for Work Package B (present report).

The Questions answered in the present report (Work Package B) are:

**Question B1. Specialist services:** To identify the evidence comparing telehealth (by video or phone) to face-to-face provision of care in specialist areas, e.g. psychiatric services, cardiac, genetics, etc.

**Question B2. Selected outcomes of interest:** To identify the evidence for critical questions, which may lack randomised controlled trial evidence, i.e., a) referrals to imaging/pathology, and b) economic impacts of telehealth.

### Methods

The scoping reviews and evidence syntheses were reported in compliance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews (PRISMA-ScR) statement.(2) The protocol was developed prospectively, and provided to the Department of Health and Aged Care prior to commencement of the reviews. The following databases were searched: PubMed (MEDLINE), Embase, and CENTRAL via the Cochrane Library. The search dates were: for question B1 (Specialist services), from inception of each database until 14 February 2023; for questions B2 (selected outcomes of interest: referrals to imaging/pathology, and economic impacts), from the inception of each database until 28 March 2023.

## Results

### Summary of the evidence and findings

**For question B1** – Specialist services – we identified 1 comprehensive overview (of 38 systematic reviews (Snoswell et al, 2021)), and 26 reviews published subsequently, for a total of 64 reviews across a broad range of specialist areas. The largest number of reviews – 13 – was identified in endocrinology, with considerable numbers also found in orthopaedics, psychiatry and cardiology (6+ each). Many areas, however, currently lack any systematic review evidence comparing the provision of services via telehealth to face-to-face. (Table 1)

Table 1 Total volume of evidence for question B1 - Specialist Services

| Specialty area                                                                     | No. of reviews |
|------------------------------------------------------------------------------------|----------------|
| Addiction Medicine                                                                 | 0              |
| Anaesthesia                                                                        | 0              |
| Cardiology/cardiovascular                                                          | 6              |
| Child health/paediatrics (including general & subspecialties)                      | 1              |
| Clinical Genetics                                                                  | 1              |
| Clinical Pharmacology                                                              | 0              |
| Dermatology                                                                        | 2              |
| Emergency Medicine                                                                 | 0              |
| Endocrinology                                                                      | 13             |
| Gastroenterology and Hepatology                                                    | 0              |
| General Medicine                                                                   | 0              |
| Geriatric Medicine                                                                 | 1              |
| Haematology                                                                        | 0              |
| Imaging (including: radiology, ultrasound, nuclear medicine)                       | 0              |
| Immunology and Allergy                                                             | 0              |
| Infectious Diseases                                                                | 0              |
| Intensive Care Medicine                                                            | 0              |
| Maternal-Foetal Medicine (including neonatal/perinatal)                            | 0              |
| Medical Oncology (including gynaecological, and other sub-specialties)             | 1              |
| Microbiology                                                                       | 0              |
| Nephrology                                                                         | 2              |
| Neurology                                                                          | 5              |
| Obstetrics and Gynaecology                                                         | 2              |
| Occupational and Environmental Medicine                                            | 0              |
| Ophthalmology                                                                      | 1              |
| Orthopaedics                                                                       | 6              |
| Other topics (multidisciplinary care, parenteral antimicrobial therapy, dysphagia) | 3              |
| Pain Medicine                                                                      | 0              |
| Palliative Medicine                                                                | 0              |
| Pathology (including: general, anatomical, chemical, forensic, etc)                | 0              |
| Psychiatry                                                                         | 7              |
| Rehabilitation Medicine                                                            | 0              |
| Respiratory and Sleep Medicine                                                     | 5              |
| Rheumatology                                                                       | 1              |
| Sexual Health Medicine                                                             | 0              |
| Sport and Exercise Medicine                                                        | 0              |
| Surgery - general + sub-specialties                                                | 5              |
| Urology                                                                            | 1              |

**For Question B2** – Selected outcomes of interest: referrals to pathology, we identified four retrospective observational studies, which generally showed a decrease in referrals in telehealth, but their findings have to be interpreted with caution due to their observational nature. For Question B2 – Selected outcomes of interest: economic impacts, we identified 3 reviews. Telehealth was generally equivalent in cost, and sometimes cost-saving. Due to the paucity of evidence for these topics, an evidence gap map was not generated.

### **Interpretation of the findings**

In general, telehealth has been more extensively studied for secondary care than for primary care, but these studies often focused on very specific clinical conditions and situations. A summary of the main findings of the present scoping review are:

#### *Effectiveness of Telehealth in Specialist Care (Question B1)*

Over 50 systematic reviews studied the effectiveness of telehealth in secondary care, addressing questions across a wide variety of clinical conditions and modalities. It is important to emphasise that these reviews usually address two separate questions:

- i. Telehealth versus usual care (add-on). However, usual care is often ill-defined, and many these studies appear to use telehealth *as an add-on service*, to provide additional clinical input for patient studied;
- ii. Telehealth versus face-to-face (substitution), where telehealth is used to provide *an alternative* to some or all of the traditional face-to-face consultations.

Some reviews find that telehealth is at least as – or more – effective than usual care. However, these reviews need to be interpreted cautiously as “usual care” was often not clearly defined and most typically telehealth was being provided as an additional service, providing additional treatment or follow up.

For those studies that examined telehealth (or a hybrid) versus face-to-face as a substitution, most found comparable effectiveness. This equivalence is consistent with our findings in primary care. However, this equivalence does not apply to all health care services: studies of telehealth as substitution will usually only be attempted where it is clear that telehealth might provide a feasible alternative. Generally, that is where the consultation relies largely on history taking or clinical interview (or possibly visual assessment via videoconference) rather than requiring hands-on physical examination, physical assessment, or procedure.

#### *Impact of telehealth on referral for imaging/pathology (Question B2)*

We could not find any trials that provided information on differential rates of referral between telehealth and face-to-face consultation. Hence, we searched for observational studies that addressed this question. However, these observational studies will be biased by the conditions under which telehealth was chosen. The few studies that exist, show mixed results with no clear trend, but this may warrant further examination.

*Economic or cost-economic outcomes (Question B2)*

There were a number of reviews of the economics of telehealth. As with primary care, the main finding was that telehealth is generally equivalent in cost, but sometimes cost-saving (often from a societal perspective), because of reductions in travel time and time off work, for either the patient or the healthcare worker. There are some possibilities for service redesign using telehealth, but these are unlikely to be adopted under Australia's fee-for-service models, though some options exist within public hospitals' activity-based funding. Finally, we note that the economic studies do not assess the impact of increased access to telehealth by patients who might previously not have accessed healthcare services.

## Introduction

Telehealth in Australia dates back to the 1920s, and the use of telegraph by the Flying Doctor Services.(3) Nearly a century later, in 2013, the Australasian Telehealth Society urged wider adoption of telehealth in Australia.(4) With the declaration by the WHO of the COVID-19 pandemic in March 2020,(5) the temporary payment of benefits for telehealth was enabled on the Medicare Benefits Schedule. This enabled the provision of telehealth care services by general practitioners, specialists, and allied healthcare professionals.(6)

In October 2020, The Institute for Evidence-Based Healthcare was contracted by the then-Department of Health, to complete a review of the evidence for the effectiveness, safety and economic impacts of the provision of primary and allied healthcare via telehealth. The Institute completed and provided the Review to the Department in February 2021.(7) In December 2021, the Australian Government announced an investment of \$106M over 4 years, to support the permanent implementation telehealth services in Australia.(8)

The uptake of telehealth by Australians has been considerable, representing 17.2% of all consultations in 2022 – over 39.9M consultations by phone, and over 5.6M consultations by video. By provider, in 2022, telehealth consultations represented: 21.9% of all GP consultations, 13.7% of specialist consultations, 27.1% of mental health consultations, 28.3% of nurse practitioner consultations and 14.5% of allied health consultations.(1)

However, since the time of the previous Telehealth Review in 2021, over two years of additional evidence on the impacts of telehealth has been published. The present Telehealth Review therefore aims both to update the findings of the previous review, and to expand its scope with several topics identified as of interest by the Department.

The current Report presents the evidence addressing 2 questions of interest to the Department:

**Question B1. Specialist services:** To identify the evidence comparing telehealth (by video or phone) to face-to-face provision of care in specialist areas, e.g. psychiatric services, cardiac, genetics, etc.

**Question B2. Selected outcomes of interest:** To identify the evidence for critical questions, which may lack randomised controlled trial evidence, i.e., a) referrals to imaging/pathology, and b) economic impacts of telehealth.

**For the purposes of the present report: “telehealth” is used to refer collectively to synchronous (‘live’) provision of care using either the telephone (i.e., teleconferencing or telephone consultation) or video (i.e., videoconferencing or video consultation).**



## Methods

The Scoping Reviews were reported in compliance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews (PRISMA-ScR) statement (see Appendix 1 – PRISMA-ScR Checklist).(2) Due to short timelines the protocol was not registered on PROSPERO or any other registry, however, the protocol was developed prospectively and provided to the Department of Health and Aged Care prior to commencement of the reviews. We used the 2weekSR – two-week systematic review – methodology to conduct the systematic reviews.(9) Where a deviation from the methods specified in the protocol occurred during the conduct of the reviews, this is reported in the relevant methods section.

As methods differed for questions B1 (telehealth vs face-to-face for provision of care in specialist areas) and B2 (selected outcomes of interest: referrals to imaging/pathology, and economic impacts of telehealth), they are reported separately.

## Methods for Question B1 – Specialist Services: To identify the evidence comparing telehealth (by video or phone) to face-to-face provision of care in specialist areas.

### Eligibility criteria

#### Participants

Includable studies involved participants of any age, gender, or condition.

#### Concept

##### *Inclusions:*

We included studies which evaluated the effectiveness of real-time (synchronous) consultations. Consultations involving asynchronous provision of care (e.g. store and forward of patient generated data) were excluded.

Consultations could include single or multiple episodes of care, but the compared groups had to receive similar care in terms of frequency, duration, and healthcare provider.

We included studies comparing telehealth (video- or phone-consultations) to face-to-face (in-person) consultations.

##### *Exclusions:*

Studies evaluating the following interventions were excluded: mobile apps, virtual reality, texting (e.g. reminders), online based platforms (e.g. information and support systems), telemonitoring, and studies of novel (non-standard) interventions.

Finally, we had considered studies comparing two different telehealth modalities to each other, e.g. teleconferencing (telephone) to videoconferencing (video) in the Horizon Scan of the evidence. We found 6 trials relevant to primary care, but found no additional systematic reviews or randomised controlled trial evidence (either published or from clinical trial registries) and therefore, this comparison is omitted here. (Systematic review of the evidence comparing the two different telehealth modalities was conducted separately, and is presented as part of Work Package A).

#### Context

Studies which evaluated provision of care to patients on a non-inpatient basis were included. Studies which evaluated provision of care to patients by specialists on an inpatient (hospital admitted) basis were excluded.

To be included, care had to be provided by a specialist, such as: psychiatrist, dermatologist, rheumatologist, oncologist, surgeon, etc. (or their equivalents in other jurisdictions).

Studies evaluating consultations between healthcare providers only (i.e., without any patient involvement) were excluded. Where a study included consultations between more than one specialist (e.g. psychiatrist and an oncologist) *and* the patient, the study was

included. Where a study included consultations between a specialist, a non-specialist care provider (e.g. primary care or allied health care provider) *and* the patient, the study was included.

### Types of sources

We included the following study designs:

- **Randomised controlled trials (RCTs)** which included more than 10 participants and are of any randomised design, including parallel, cluster, crossover, factorial, or mixed
- **Systematic reviews**
- **Any study design** if the study reported on diagnostic accuracy of telehealth vs. face-to-face provision of care, as long as all other inclusion criteria are met

We had pre-specified that all other study designs (non-randomised trials, observational studies, qualitative-only studies) and all other types of reviews (e.g. literature, scoping, etc.) would be excluded. However, where the only type of review available was a scoping review which was comprehensive, we included it (e.g., the economics question). This represents a deviation from the Protocol.

We did not impose restrictions by language – i.e., if the publication met the inclusion criteria but was published in a language other than English, it was includable. We included only those publications that were published in full. That is, we excluded publications available as abstract only (e.g., conference abstract) with no additional results information available about the study's results (e.g., from a clinical trial registry record).

### Search strategies to identify the relevant studies

The following databases were searched: PubMed (MEDLINE), Embase, and Cochrane Library including CENTRAL (which includes the clinicaltrials.gov and the World Health Organisation's International Clinical Trial Registry Platform, ICTRP). The search dates were from inception of each database until 14 February 2023. Full search strings for each database searched are presented in the appendices.

### Study selection

A single review author (PG, TA, MB, HG, OB) screened the titles and abstracts for inclusion against the inclusion criteria. One review author (JC) retrieved full-texts, and single authors (PG, TA, MB, HG, OB) screened the full-texts for inclusion. Where uncertainties arose about including a study, the screener conferred with another review author. The selection process was recorded in sufficient detail to complete a PRISMA flow diagram (see Appendix). In a protocol deviation, due to a sufficient volume of relevant, higher level of evidence (systematic reviews) found, the randomised controlled trials identified and deduplicated (n=493) were not screened. The full list of the trials is, however, provided in Appendix 6.

### **Data extraction**

We used a data extraction form to extract data from each included study. The form was piloted on 2 studies. A single review author (PG, TA, MB, HG, OB) extracted the data from each included study. Data was extracted on:

- A. study design (i.e. randomised controlled trial, or systematic review),
- B. jurisdiction where the study took place,
- C. telehealth type evaluated (e.g. videoconferencing or teleconferencing), and
- D. specialist area that is the focus of the study (e.g. cardiology, psychiatry, genetics, etc.).

### **Data analysis and presentation**

We presented the findings narratively, in tables, and in figures, as appropriate. To present the areas where the evidence currently exists and where it is currently not available, we generated an evidence gap map.<sup>(10)</sup> The map uses the Australian Medical Council's list of recognised medical specialties, which has been adopted for the present purposes by amalgamating categories (e.g. general and sub-specialty surgeries have been amalgamated into a category 'surgery'; general pathology, chemical pathology, etc. have been amalgamated into a category 'pathology'; etc.)

## **Methods for Question B2 – Selected outcomes of interest: To identify the evidence for critical questions, which may lack randomised controlled trial evidence, i.e., a) referrals to imaging/pathology, and b) economic impacts of telehealth.**

### **Eligibility criteria**

#### **Participants**

Includable studies involved participants of any age, gender, or condition.

#### **Concept**

##### *Inclusions:*

We included studies which evaluated the effectiveness of real-time (synchronous) consultations. Consultations involving asynchronous provision of care (e.g. store and forward of patient generated data) were excluded.

Consultations could include single or multiple episodes of care, but the compared groups have to receive similar care in terms of frequency, duration, and healthcare provider.

We included studies comparing telehealth (videoconferencing or teleconferencing) to face-to-face (in-person) consultations.

##### *Exclusions:*

Studies evaluating the following interventions were excluded: mobile apps, virtual reality, texting (e.g. reminders), online based platforms (e.g. information and support systems), telemonitoring, and studies of novel (non-standard) interventions.

#### **Context**

The following care providers (or their equivalents in other healthcare systems) were included:

- General Practitioner: e.g. family physician, general practitioner, etc.
- Allied healthcare provider: e.g. psychologist, occupational therapist, physiologist, practice nurse, speech pathologists, dieticians, Aboriginal and Torres Strait Islander healthcare practitioners and workers, etc.
- Nurse practitioner
- Midwife

Clinician-to-clinician consultations not involving patients (e.g. GP to midwife) were excluded.

Specialist-provided care (e.g. by psychiatrists, dermatologists, rheumatologists, etc.) was excluded, unless the care *also* included both the patient and one of the includable providers (i.e., the care would involve, for example, a patient, a GP, and a psychiatrist).

Studies in tertiary care setting (i.e., in-hospital patients) were excluded. However, studies involving patients who were discharged from the hospital and undergoing care by one of the included care providers (see above) were included.

To be included, the study also had to report on one of the following outcomes, identified in the Horizon Scan for Work Package B. [Protocol deviations are identified in square brackets.]

1. Unnecessary prescribing of antibiotics [Protocol Deviation: this question was addressed in Work Package A, as sufficient high-quality evidence was identified, and is therefore omitted here].
2. **Quality and frequency of referrals/requests for imaging/pathology – reported in the Results section of the present report**
3. Changes in the frequency of patient attendance [Protocol Deviation: this question was addressed in Work Package A, as sufficient high-quality evidence was identified, and is therefore omitted here].
4. Escalation to emergency department presentations. [Protocol Deviation: this question was addressed in Work Package A, as sufficient evidence was identified, and is therefore omitted here].
5. Diagnostic accuracy [Protocol Deviation: this question was addressed in Work Package A, as sufficient evidence was identified, and is therefore omitted here].
6. **Economic or cost-economic outcomes – reported in the Results section of the present report**

Whilst conducting the present scoping review, where additional relevant studies were identified which addressed one of the outcomes or topics above that were instead addressed in Work Package A, the evidence was integrated into the updated report for Work Package A.

### Types of sources

We included the following study designs:

- **Systematic reviews** of randomised or observational studies (or both)
- **Observational studies:** cohort studies, case-control studies, before-and-after (pre/post) studies, or interrupted time series; all other observational study designs are excluded. Studies needed to include more than 10 participants to be included.
- **Any study design** if the study reported on diagnostic accuracy of telehealth vs. face-to-face provision of care, as long as all other inclusion criteria are met

We had prespecified that all other study designs and all other types of reviews (e.g. literature, scoping, etc.) would be excluded. However, where the only type of review available on a topic of interest was a scoping review which was comprehensive, we included it (e.g., the economics question). This represents a deviation from the Protocol.

We did not impose restrictions by language (i.e., if the publication met the inclusion criteria but was published in a language other than English, it was includable). We included only those publications that were published in full. That is, we excluded publications available as abstract only (e.g., conference abstract) with no additional results information available about the study's results (e.g., from a clinical trial registry record).

### **Search strategies to identify the relevant studies**

The following databases were searched: PubMed (MEDLINE), Embase, and Cochrane Library including CENTRAL (which includes the clinicaltrials.gov and the World Health Organisation's International Clinical Trial Registry Platform, ICTRP). The searches were from inception of each database or registry, until 28 March 2023. Full search strings for each database, and for each question (referrals to imaging/pathology, economics), are presented in the appendices.

### **Study selection**

A single review author (PG, TA, MB, HG, OB) screened the titles and abstracts for inclusion against the inclusion criteria. One review author (JC) retrieved full-texts, and single authors (PG, TA, MB, HG, OB) screened the full-texts for inclusion. Where uncertainties arose about including a study, the screener consulted another review author. The selection process was recorded in sufficient detail to complete a PRISMA flow diagram (see Appendix). In a protocol deviation, due to a sufficient volume of relevant, higher level of evidence (systematic reviews) found, the observational studies identified and deduplicated (n=612) for question B2: Special Outcomes: Economic Impacts were not screened. The full list of the trials is, however, provided in Appendix 7.

### **Data extraction**

We used a data extraction form to extract data from each included study. The form was piloted on 2 studies. A single review author (PG, TA, MB, HG, OB) extracted the data from each included study. Data was extracted on:

- A. study design (i.e. systematic review, or type of observational study type),
- B. jurisdiction/setting where the study took place,
- C. telehealth types evaluated (e.g. videoconferencing or teleconferencing), and
- D. which of the outcomes of interest the study addresses:

### **Data analysis and presentation**

We presented the findings narratively, in tables, and in figures, as appropriate. To present the areas where the evidence currently exists and where it is currently not available, we had intended to generate an evidence gap map, however, as relatively low volume of evidence was identified - 4 observational studies for the question on referrals to imaging/pathology, and 3 reviews on the economic impacts – we did not do so [deviation from the protocol].

## Results

Results are reported separately, by question, in the following sequence:

Results for **Question B1. Specialist services:** To identify the evidence comparing telehealth (by video or phone) to face-to-face provision of care in specialist areas, e.g. psychiatric services, cardiac, genetics, etc.

Results for **Question B2. Selected outcomes of interest:** To identify the evidence for critical questions, which may lack randomised controlled trial evidence, i.e.:

- a) referrals to imaging/pathology, and
- b) economic impacts of telehealth.



## **Results for Question B1. Specialist services: To identify the evidence comparing telehealth (by video or phone) to face-to-face provision of care in specialist areas, e.g. psychiatric services, cardiac, genetics, etc.**

We identified **1 comprehensive overview (of 38) systematic reviews with meta-analysis** (Snoswell et al, 2021) which examined the clinical effectiveness of telehealth, and whose findings we summarise below.

We found **additional 26 reviews** published since the end of the search date in Snoswell et al's overview – those are summarised subsequently.

### **Snoswell et al (2021)**

The aim of the overview of systematic reviews by Snoswell et al, was to synthesise recent evidence about the clinical effectiveness of telehealth services.

The authors searched for systematic reviews with meta-analyses published between 2010 and 2019, which included clinical effectiveness as an outcome. Many of the included studies examined telehealth as an add-on rather than a replacement of face-to-face visits, so the interpretation needs to take this limitation into account.

The authors found 38 systematic reviews with meta-analyses, covering 10 areas: endocrinology (n = 13), psychiatry and psychology (n = 7), neurology (n = 4), pulmonary (n = 4), cardiovascular disease (n = 3), nephrology (n = 2), dermatology (n = 1), obstetrics (n = 1), ophthalmology (n = 1), and multidisciplinary care (n = 2).

The reviews found that for all these areas, telehealth across a range of modalities was as effective, if not more so, than usual care, but these comparisons were not all to equivalent face-to-face care. We briefly summarise the key clinical areas below.

#### **Endocrinology (n=13 reviews).**

For the provision of monitoring support and tailored advice for diabetic patients, mixed-modality telehealth was consistently successful. Nine of the 13 systematic reviews demonstrated better HbA1c control from the telehealth interventions, with three demonstrating similar HbA1c measurements at follow-up (varying from 3 to 12 months). Most studies focused on remote-monitoring telehealth modalities (with and without decision support), although these were complemented with videoconference, teleconference, email, text message and other technologies.

#### **Neurology (n=4 reviews).**

The 4 neurology systematic reviews were all related to stroke recovery, using a mix of telehealth modalities, and involving clinician-clinician and patient-clinician communication. All outcomes were similar between telehealth and usual care groups, including independence in activities and limb function following rehabilitation, and subsequent adverse events, such as symptomatic intracerebral haemorrhage post-treatment.

### **Cardiovascular disease (n=3 reviews).**

The cardiovascular systematic reviews described tailored telehealth monitoring and intervention for implantable cardioverter-defibrillators (ICDs), anticoagulant management (for all treatment indications) and primary and secondary care interventions for CVD.

### **Dermatology (n=1).**

One systematic review examined skin cancer diagnosis accuracy from images (synchronous and asynchronous) and reported good sensitivity (95%) and specificity (84%) for the use of telehealth. The authors concluded that store-and-forward teledermatology was sufficient to correctly identify the majority of malignant lesions examined, but there was insufficient comparative evidence for teledermatology compared face-to-face consultations, which was inconclusive.

### **Commentary**

Overall, Snoswell et al's overview suggested that telehealth can be equivalent or more clinically effective when compared to usual care, and supported the view that in the right context, telehealth will not compromise the effectiveness of clinical care when compared with conventional forms of health service delivery.

### **Subsequent reviews identified by IEBH**

Subsequent to Snoswell et al's overview, we identified a further 26 systematic reviews addressing telehealth in secondary care.

The topics covered by these systematic reviews included: orthopaedics (6 reviews), cardiac telerehabilitation (3 reviews), COPD (1 review), obstetrics and gynaecology (1 review), dermatology (1 review), cancer (1 review), surgery (3 reviews), pre-operative assessments (1 review), urology (1 review), elderly (1 review), rheumatology (1 review), neurology (1 review), ENT (1 review), tele-genetics (1 review), parenteral antimicrobial therapy (1 review), dysphagia (1 review), child and adolescent psychiatry (1 review).

The summary of the key characteristics of these reviews, including the clinical area, population/setting, intervention, comparator, outcomes and types of studies included is provided in the Table 2, below.

The findings of the individual reviews are summarised subsequently.

Table 2 Characteristics of the subsequent systematic reviews (n=26)

| Study                    | Clinical area              | Population/settings                                               | Intervention                                                                                                                           | Comparator                    | Outcomes                                                           | Studies included          |
|--------------------------|----------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------|---------------------------|
| <b>Davey 2020</b>        | Orthopaedics               | Outpatients with fractures                                        | Virtual fracture clinic review (multidisciplinary team meets to discuss patient) this feeds back to patient care                       | Usual care                    | Clinical outcomes, patient satisfaction, Costs                     | Various                   |
| <b>Fahey 2022</b>        | Orthopaedics               | Various orthopaedic patients                                      | Mainly videoconferencing for diagnosis, rehab and follow-up but other modalities included                                              | F2F/usual care                | Clinical, patient satisfaction, costs                              | Various                   |
| <b>McDonnell 2022</b>    | Orthopaedics               | Various orthopaedic patients                                      | Videoconferencing in orthopaedic practice                                                                                              | F2F                           | Patient satisfaction, ^VAS, ^WOMAC, #TUG, stair test               | RCTs only                 |
| <b>Tsang 2022</b>        | Orthopaedics               | Patients who underwent total knee replacement                     | telerehabilitation                                                                                                                     | F2F rehab                     | Pain (VAS)and physical function scores (WOMAC)                     | RCTs only                 |
| <b>Jansson 2022</b>      | Orthopaedics               | Patients who underwent total knee replacement or hip arthroplasty | Mainly video but other modalities were included                                                                                        | F2F                           | **ROM, TUG test, stair test, WOMAC. KOOS, VAS                      | RCTs only                 |
| <b>Piche 2021</b>        | Orthopaedics               | Physical examination of the spine                                 | Virtual spinal examination                                                                                                             | F2F examination               | accuracy                                                           | Various                   |
| <b>Maulana 2022</b>      | Cardiac                    | Patients with heart failure                                       | Cardiac telerehabilitation; many were videoconferencing and teleconferencing but other modalities used such as messaging               | Usual care                    | Safety and efficacy                                                | RCTs only- Scoping review |
| <b>Ramachandran 2022</b> | Cardiac                    | Patients 18+ with CHD who is in phase 2 cardiac rehabilitation    | Cardiac telerehabilitation; various modalities used such as mobile health apps, text messages, teleconferencing, and videoconferencing | Supervised or Usual care      | Functional capacity (6 min walking test)                           | RCTs only                 |
| <b>Piskulic 2021</b>     | Cardiac                    | Telehealth in cardiology                                          | Variety of telehealth                                                                                                                  | Usual care                    |                                                                    | Overview of reviews       |
| <b>Vinolo-Gil 2022</b>   | COPD                       | Patients diagnosed with COPD                                      | Pulmonary tele-rehabilitation; used various modalities; video was the main one.                                                        | F2F outpatient rehabilitation | Physical, psychological variables                                  | RCTs only                 |
| <b>DeNicola 2020</b>     | Obstetrics and Gynaecology | O&G outpatient care                                               | Telehealth consultation                                                                                                                | Usual care                    | Various                                                            | Various                   |
| <b>Lopez-Liria 2022</b>  | Dermatology                | Patients of dermatological services                               | Remote monitoring follow-up: all used asynchronous modalities                                                                          | F2F follow-up                 | Costs of follow-ups, patient satisfaction                          | Various                   |
| <b>Uemoto 2022</b>       | Cancer                     | Patients with cancer receiving outpatient care                    | Videoconferencing of outpatient care                                                                                                   | F2F care                      | Patient satisfaction, costs, attendance, other functional outcomes | RCTs                      |

|                                      |                   |                                                                                                                    |                                                                                                                                                       |                                             |                                                                     |                          |
|--------------------------------------|-------------------|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------|--------------------------|
| <b>Xiao 2023</b>                     | Cancer surgery    | Follow up after cancer surgery                                                                                     | Telehealth follow up visit                                                                                                                            | Usual care                                  | Safety and satisfaction                                             | Various                  |
| <b>GlobalSurg Collaborative 2022</b> | Surgery (various) | Post-surgical followup                                                                                             | Telehealth follow up visit                                                                                                                            | Usual care                                  | Surgical site infections                                            | Cohort and meta-analysis |
| <b>Ng 2022</b>                       | Surgery (various) | Post-surgical followup                                                                                             | Telehealth follow up visit                                                                                                                            | Usual care                                  | Surgical site infections                                            | Various                  |
| <b>Zhang 2021</b>                    | Preoperative      | Pre-operative assessments                                                                                          | Telehealth assessment                                                                                                                                 | Usual assessment                            | Cancellation rates                                                  | Various                  |
| <b>Edison 2020</b>                   | Urology           | Urology clinics                                                                                                    | Telehealth consultation                                                                                                                               | Face-to-face                                | Various                                                             | Various                  |
| <b>Velayati 2020</b>                 | Elderly           | Elderly patients aged 60 and over who used telerehabilitation after surgical interventions or therapeutic purposes | Online or offline telerehabilitation for treatment purposes                                                                                           | Traditional rehabilitation                  | All clinical and individual outcomes related to effectiveness       | RCTs only                |
| <b>Jackson 2021</b>                  | Rheumatology      | Outpatient visits                                                                                                  | Telehealth consultation                                                                                                                               | Usual care                                  | Satisfaction, disease activity                                      | Various                  |
| <b>Leon-Salas 2023</b>               | Neurology         | Patients with any neurological disease; included both specialist and non-specialist care                           | Remote consultation for diagnosis, management, or follow-up + usual care; included both asynchronous and synchronous modalities                       | Usual standard care                         | Safety, or disease management                                       | RCTs only                |
| <b>Gupta 2021</b>                    | ENT               | Paediatric or adults with ENT disorders                                                                            | Remote consultation from an ENT specialist or surgeon; various modalities used. Many were video (n=20), and phone (14) and 17 were specific platforms | F2F consultations                           | Patient pathway efficiency, satisfaction, cost analysis, and safety | Various                  |
| <b>Brown 2021</b>                    | Telegenetics      | Specialist services                                                                                                | Videoconferencing for clinical genetics                                                                                                               | either F2F or tele-conferencing             | Patient satisfaction, genetic knowledge, psychosocial outcomes      | RCTs and non RCTs        |
| <b>Durojaiye 2022</b>                | *PAT              | Patients receiving parenteral antibiotics in home or outpatient setting                                            | Teleconferencing or videoconferencing                                                                                                                 | With or without conventional outpatient PAT | Patient outcomes & safety, satisfaction, cost-effectiveness         | Various- no RCTs         |
| <b>Reverberi 2022</b>                | Dysphagia         | Patients with dysphagia due to neurological disorders in acute or chronic settings                                 | Telerehabilitation; various modalities used but mostly synchronous                                                                                    | Standard patient care and management        | Quality of life, satisfaction, reliability of remote evaluation     | Various                  |
| <b>Kiss 2021<sup>1</sup></b>         | Psychiatry        | Child and adolescent psychiatry                                                                                    | Telehealth consultation                                                                                                                               | Usual care                                  | Diagnostic and therapeutic effects                                  | Various                  |

\*PAT=Parenteral antimicrobial therapy; ^WOMAC= Western Ontario and McMaster Universities Osteoarthritis Index; #TUG=Timed Up and Go test; ^^VAS=Visual analogue scale scores; \*\*ROM=Range of motion; F2F=face-to-face

## Orthopaedic telerehabilitation

Davey 2020 included fifteen studies. A subgroup analysis found that the rate of discharge for those with fifth metatarsal was 81.2% and for radial head and neck fractures was 93.7%; the mean cost per patient was lower for the virtual clinic at \$128 versus \$228 for the face-to-face clinic. Patient satisfaction was high in the virtual clinic (81%). The limitation of this review is the large heterogeneity among the studies and although it contained some randomised controlled trials, they were not rated as very high quality. There is evidence to support a virtual fracture clinic for non-operative management of the fifth metatarsal fractures and for radial head and neck fractures. However, it was not recommended yet for routine use of all types of fractures.

The systematic review by Fahey, 2022 included 41 studies. Five studies used teleconferencing and twenty-four of the included studies used videoconferencing. However, seven out of the twenty-four studies were asynchronous. Furthermore, other studies used modalities that were excluded, e.g., four studies used web applications, three used message services, and two used a digital avatar. Of the 41 total studies, 15 studies assessed clinical outcomes of telehealth compared to traditional care. Nine of these showed no significant difference, two demonstrated noninferiority, and four found telehealth to be superior. Eleven studies evaluated patient reported outcomes and all demonstrated high patient satisfaction. Nine studies considered outcomes related to costs, concluding that costs were decreased for telehealth compared to traditional care. The review is limited by large heterogeneity among the included studies – although it contained several RCTs, they varied in quality. Overall, telehealth was found to have good clinical outcomes, high patient satisfaction and cost-effectiveness.

McDonnell, 2022, included eleven randomised controlled trials and performed a meta-analysis. There was no significant difference between telehealth and face-to-face care for: patient satisfaction (RR 0.98, 95% CI 0.90-1.07,  $p=0.52$ ), patient retention (RR 1.25, 95% CI 0.51-3.06,  $p=0.54$ ), WOMAC score ( $p=0.30$ ), TUG Test ( $p=0.40$ ) and Stair Test ( $p=0.18$ ). However, VAS scores favoured face-to-face management ( $p=0.02$ ). The review concluded that telehealth via videoconferencing is as effective as traditional face-to-face consultations for orthopaedic patients in recovery and rehabilitation. Further studies were recommended to evaluate for initial consultations.

A systematic review by Tsang 2022 included eleven randomised controlled trials and a meta-analysis, comparing telerehabilitation to face-to-face care. No significant differences were found in the improvement of pain score on the VAS ( $p=0.34$ ) and WOMAC physical function ( $p=0.62$ ). The median total costs were significantly lower ( $p<0.001$ ) in the telerehabilitation group (\$1050) versus the face-to-face group (\$2805). Overall, hospital-based resources were 60% less in the telerehabilitation group. Telerehabilitation achieved comparable improvements in various clinical outcomes and possible better cost effectiveness in patients.

The systematic review by Jansson, 2022 included nine randomised controlled trials and conducted a narrative synthesis (meta-analysis was not possible due to heterogeneity amongst the included studies). The intervention modality was mainly videoconferencing, but other modalities were also included, e.g., asynchronous video and an app-based system. No differences were found between telerehabilitation, and face-to-face outpatient rehabilitation based on physical functioning.

Finally, Piche 2021 undertook a systematic review to examine (1) the reliability of the physical examination of the spine using telehealth as it pertains to spinal pathology and (2) patient satisfaction with the virtual spine physical examination. The review searched EMBASE, PubMed, Medline Ovid, and SCOPUS databases from inception until April 2020. Three studies (88 patients) were included, comparing virtual with face-to-face spine physical examinations. These studies showed acceptable reliability for portions of the low back virtual exam. Patient satisfaction surveys were conducted in 2 of the studies and showed general satisfaction (>80% would recommend).

### **Cardiac telerehabilitation**

Maulana, 2022 included thirteen studies. This review did not compare telerehabilitation directly with standard face-to-face care but determined generally how safe, effective, and feasible it can be. Overall, the included studies were assessed to have a moderate level of bias. Most patients adhered to and completed all provided programs. Cardiac telerehabilitation successfully improved patients' physical fitness, quality of life, and mental health. It was concluded that cardiac telerehabilitation can be safe, effective, and feasible.

The systematic review by Romochandran, 2022, considered phase 2 cardiac rehabilitation which involves rehabilitation services delivered in an outpatient setting. Meta-analyses included 14 RCTs. A common source of bias was a lack of blinding of both participants and personnel. Home based cardiac telerehabilitation demonstrated a significant improvement in functional capacity compared to usual care (MD=25.95, 95%CI 12.67 to 39.22,  $p<0.001$ ) but it was comparable to face-to-face (centre-based) cardiac rehabilitation (MD=10.60, 95% CI -32.22 to 53.41,  $p=0.63$ ). Home-based cardiac telerehabilitation is an effective option for patients with coronary heart disease accessing phase 2 rehabilitation.

Piskulic 2021 conducted a rapid review on the impact of virtual visits in cardiovascular ambulatory settings, on patients' healthcare utilisation and mortality. 7 systematic reviews and 12 randomised control trials were included, with the majority ( $n = 15$ ) focusing on telehealth in heart failure. Based on the appraisal of evidence, virtual visits are non-inferior, or more effective, in reducing hospitalizations and visits to emergency departments in patients with CVD compared to traditional standard in-clinic/ambulatory care.

### **COPD telerehabilitation**

A systematic review (without a meta-analysis) of nine randomised controlled trials was completed by Vinolo-Gil, 2022. Only 56 % of the trials were assessed as having a good methodological quality. There were no differences found between telerehabilitation and outpatient pulmonary rehabilitation for physical and psychological variables. Telerehabilitation was found to be just as effective as face-to-face rehabilitation for COPD patients.

## **Obstetrics and Gynaecology**

DeNicola conducted a systematic review to examine the effectiveness of telehealth interventions for improving obstetric and gynaecologic health outcomes. They searched ClinicalTrials.gov, Cochrane Library, Cochrane CENTRAL, EMBASE, PubMed, and MEDLINE. Seven studies met inclusion criteria (31,967 participants). Telehealth interventions overall improved obstetric outcomes related to smoking cessation and breastfeeding. Telehealth interventions decreased the need for high-risk obstetric monitoring office visits while maintaining maternal and foetal outcomes. Telehealth provision of medication abortion services had similar clinical outcomes compared with face-to-face care and improved access to early abortion. Telehealth interventions were associated with improvements in obstetric outcomes, perinatal smoking cessation, breastfeeding, early access to medical abortion services, and schedule optimization for high-risk obstetrics.

## **Dermatology**

Lopez-Liria 2022 included eight studies which could not be meta-analysed due to a high level of heterogeneity. All studies evaluated asynchronous remote monitoring modalities. Although these asynchronous methods were excluded as per our exclusion criteria, they are commonly used in teledermatology. Most studies were rated good quality, with one rated fair. All included studies indicated that teledermatology lowers costs compared to face-to-face care, and satisfaction levels for both patients and clinicians remained adequate. Follow-up by teledermatology can be more cost effective than face-to-face follow-up.

## **Cancer**

A systematic review by Uemoto, 2022, evaluated the efficacy of telehealth using only videoconferencing, in outpatient care for patients with cancer. Six randomised controlled trials were meta-analysed. The overall risk of bias was high in all studies, except for the outpatient attendance outcome. There was no statistical difference between telehealth and face-to-face care for patient satisfaction (SMD=0.11, 95%CI 0.18 to 0.40, p=0.47), attendance (risk difference = 0.02%; 95%CI -0.04 to 0.09, p=0.50). Only one study looked at outpatient visit costs, which were lower for telehealth in Euros (p<0.01), and one study found that telehealth had lower outpatient visit costs in US dollars (p<0.01). Telehealth using videoconferencing in outpatient care for patients with cancer may be as effective as face-to-face care, and should be utilised for those who may benefit.

## **Surgery**

A review by Xiao 2023, examined the feasibility, safety, and patient satisfaction with telehealth follow-up appointments after cancer operations. Eleven studies (3369) were included, of patients who underwent surgical resection of a malignancy with at least one study arm describing telehealth follow-ups. Cancer types included: gynaecological, colorectal, oesophageal, lung, thyroid, breast, prostate and major HPB resections. Detection of recurrence and readmission rates were similar for telehealth consultations and face-to-face visits. Most studies showed high patient and healthcare provider satisfaction with telehealth consultations following cancer resection.

Two reviews looked at surgical site infection. The review by Ng 2022 aimed to assess the accuracy of using telehealth in the diagnosis of surgical site infections in post-surgical adult patients, compared to face-to-face assessments. They searched 6 databases (PubMed, MEDLINE, Embase, Web of Science, Scopus and CENTRAL) from inception to 1 December 2020. Six studies met inclusion criteria, with methodological quality assessed as moderate based on the MINORS score. Four studies used teleconferencing, whilst two used mobile applications. Telehealth modalities were able to accurately diagnose 66 surgical site infections, but an additional 15 were found on direct clinical review. The diagnostic accuracy across the studies ranged from 7% to 100%. The studies by NIHR Global Health Research Unit on Global Surgery reported both a cohort study and systematic review. The studies aimed to examine surgical site infection (SSI) reported up to 30-days after surgery, comparing rates reported using telehealth (telephone and/or video assessment) to those with face-to-face review. The first study was an international cohort study of adult patients undergoing abdominal surgery discharged from hospital. The second study combined this data with the results of a systematic review, to perform a meta-analysis. The cohort study included 15,358 patients from 66 countries (8069 high income, 4448 middle income, 1744 low income). Of these, 6907 (45%) were followed up by telehealth. The SSI rate reported in the telehealth group was lower than in face-to-face follow-up group (13.4% vs. 11.1%,  $P < 0.001$ ), which persisted after risk adjustment in a mixed-effects model. The meta-analysis combining all studies found that the SSI rate reported was lower with telehealth (OR 0.67, 95% CI 0.47-0.94) than face-to-face (reference) follow-up.

### **Pre-operative Assessments**

A systematic review and meta-analysis by Zhang 2021 examined the effectiveness of virtual preoperative assessment for the evaluation of surgical patients. Seven databases were searched to May 2021. Fifteen studies (31,496 patients) were included, with an average age of patients of  $58 \pm 15$  years. Compared to face-to-face evaluation, virtual preoperative assessment resulted in similar surgery cancellation rates, with a pooled cancellation rate of 2% (95% CI: 1 to 3%). Most studies reported a positive patient experience, with a pooled estimate of 90%.

### **Urology**

A systematic review by Edision 2020 aimed to identify the clinical, fiscal and environmental evidence on the use of urological telehealth and/or virtual clinic (VC) strategies. The authors searched Embase, Medline and the Cochrane Review Database to identify evidence on adult urology telehealth or VC strategies. They included 18 studies (2 randomised controlled trials, 10 prospective studies, 6 retrospective studies). Urology sub-specialities included: uro-oncology ( $n = 6$ ); general urology ( $n = 8$ ); endo-urology ( $n = 2$ ); and lower urinary tract symptoms and/or incontinence ( $n = 2$ ). Across all sub-specialties, prospective studies using VCs reported a primary median VC discharge rate of 17% and a primary median face-to-face clinic referral rate of 32%. Direct cost analysis suggested annual cost-savings of £56 232.



### **Elderly (telerehabilitation)**

Velayati, 2020 conducted a systematic review to assess the effectiveness of telerehabilitation versus face-to-face rehabilitation for therapeutic purposes in the elderly. Telerehabilitation was used for elderly patients after stroke, COPD, total knee replacement, and chronic heart failure. Eight randomised controlled trials were included. No meta-analysis was completed, as the outcome measurements and scales varied among the included studies. Overall, there was no significant difference between the telerehabilitation and face-to-face rehabilitation across most outcomes. Telerehabilitation can be considered a viable alternative to face-to-face rehabilitation.

### **Rheumatology**

A review by Jackson 2021 examined the use of telehealth for the diagnosis and management of inflammatory, noninflammatory and/or autoimmune rheumatic diseases. They searched MEDLINE, Scopus, Cochrane Trials, Embase databases, and MedRxiv for interventional or observational studies published between August 2015 and January 2021. Included studies had to report the relevant outcomes (e.g., satisfaction, disease activity, quality of life) and involve telehealth provided by rheumatologists to people with rheumatic disease. They identified 20 studies: eight observational, six randomised trials, and two controlled trials. Studies included general rheumatology patients (n=9), rheumatoid arthritis (n=5), gout (n=2), osteoarthritis (n=2), unspecified inflammatory arthritis (n=1), and osteoporosis (n=1). Most studies found that telehealth was as good as usual or face-to-face care for disease activity, patient satisfaction, total societal costs, and other patient reported outcomes.

### **Neurology**

A systematic review by Leon-Salas, 2023, included 25 studies (23 studies were meta-analysable). Various types of neurological diseases were included, including stroke (11 studies), Parkinson's Disease (4), multiple sclerosis (3), epilepsy (2) and one each on: dementia, spina bifida, migraine, cerebral palsy, and brain damage. Comparison was telehealth combined with usual care versus usual care only. Most of the evidence was for stroke patients, with the quality of studies ranging from moderate to very low. Among the stroke studies, teleneurology plus usual care was significantly better than usual care alone, for several outcomes: functional state studies ( $p < 0.01$ ), depression ( $p < 0.04$ ), motor function ( $p < 0.0001$ ), generic quality of life ( $p = 0.02$ ), healthcare utilisation ( $p = 0.03$ ), and healthy lifestyle ( $p = 0.03$ ). Evidence for the other areas was limited. Telehealth combined with face-to-face care compared to usual care alone can be beneficial for stroke patients. However, further research is required to confirm these findings for stroke patients, and to establish the effectiveness for other neurological diseases.

### **Ear, nose, and throat (ENT)**

Fifty-three studies were included in Gupta 2021, but the review did not conduct a meta-analysis, as there was considerable variation amongst the studies. Telehealth consultations usually reduced costs and had high patient satisfaction. However, in 13-72% of the initial telehealth consultations, a face-to-face follow-up appointment was required. Remote consultation for ENT patients has the potential for improving some outcomes, however, it may not be suitable in all circumstances. Further research is required to explore suitability across a range of contexts.

## **Telegenetics**

The systematic review by Brown, 2021 evaluated the evidence for telegenetics via videoconferencing, compared to either face-to-face or by teleconferencing. Thirteen studies were included; most were rated at moderate risk of bias. Eight studies compared telegenetics (using video) to face-to-face consultations and three studies compared telegenetics (using video) with teleconferencing. Patient satisfaction, genetic knowledge, and psychosocial outcomes were similar for both video and face-to-face consulting. Furthermore, telegenetics delivered by video may be better than teleconferencing delivery, for knowledge gain and reduction in anxiety and depression. Overall, there is evidence that genetic counselling delivered by videoconferencing is an acceptable alternative to in person counselling.

## **Parenteral antimicrobial therapy**

A systematic review by Durojaiye 2022 included 12 publications – however, of those, only five were full length articles and seven were conference abstracts. No randomised controlled trials were included. Meta-analysis was possible for the outcome of unplanned readmission. Based on data from six cohort studies, the risk of readmission was significantly lower for the telehealth group compared to the conventional outpatient group (RR 0.58, 95% CI 0.38-0.88;  $p = 0.01$ ). Telehealth for patients receiving parenteral antimicrobial therapy was found to deliver safe and cost-effective care. Higher quality studies are required.

## **Dysphagia**

Sixteen articles were included in the systematic review by Reverberi, 2022 which looked at the role of telehealth delivery in the management of swallowing disorders. No meta-analyses were conducted, and none of the included studies were randomised trials. Telerehabilitation was shown to have significant levels of agreement and high satisfaction from both clinicians and patients. Telerehabilitation is beneficial in people with swallowing problems caused by a neurological condition, however, further studies of higher methodological quality are required.

## **Child and adolescent psychiatry**

Kiss 2021 aimed to summarise the feasibility, efficacy and effectivity of telehealth services in child and adolescent psychiatry. They searched 3 databases (PubMed, Cochrane Database of Systematic Reviews and Web of Science) for publications after 2015. The studies found similar feasibility, efficacy and effectivity of diagnostic and therapeutic methods in telechild and adolescent psychiatry as in face-to-face services.

## **Conclusion**

Most areas within secondary care had found that telehealth or telerehabilitation was just as effective as face-to-face traditional modalities. However, in many cases, the studies were of low methodological quality, and further research, to generate higher quality evidence was recommended.

## Final Commentary

Telehealth is a viable option for those patients receiving secondary care and there is extensive disease area-specific evidence. However, further, higher-quality and more methodologically robust research is needed.

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## Results for Question B2. Selected outcomes of interest: Effects of Telehealth vs face-to-face consultations on referral to imaging/pathology

We identified four observational studies addressing this question. **The four observational studies primarily demonstrated a decrease in referrals in telehealth consultations.** The four studies all used the accelerated adoption of telehealth during the pandemic as an opportunity to measure the differences in referral patterns in their respective hospitals and clinics. However, the results are not conclusive due to the studies' observational (before-and-after) nature (Table 3).

Table 3 Summary of four observational studies

| Study ID                             | Category                         | Telehealth                                                                                                                                           | Face-to-face (F2F)                                     | Referral difference* |
|--------------------------------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|----------------------|
| <b>Hardie 2022 (Australia)</b>       | Population/setting               | 807 general practice data from New South Wales and Victoria between Jan 2019 and Dec 2020                                                            |                                                        |                      |
|                                      |                                  | n=5,787,639                                                                                                                                          | n=13,459,424                                           |                      |
| Retrospective observational study    | Pathology (blood test) referrals | 5% (4-6% over study period)                                                                                                                          | 10% (highest 11% in Feb 2020 to lowest 5% in Apr 2020) | -5%                  |
| <b>Martos-Perez 2021 (Spain)</b>     | Population/setting               | Hospital care (internal medicine) teleconferencing visits from 15 March to 31 May 2020 were compared with F2F visits during the same period in 2019. |                                                        |                      |
|                                      |                                  | n=5842                                                                                                                                               | n=5908                                                 |                      |
| Retrospective observational study    | Lab tests                        | 51%                                                                                                                                                  | 61%                                                    | -10%                 |
|                                      | Imaging                          | 15%                                                                                                                                                  | 23%                                                    | -8%                  |
|                                      | Referral to specialists          | 5%                                                                                                                                                   | 14%                                                    | -9%                  |
| <b>Offiah 2022 (Ireland)</b>         | Population/setting               | Single hospital cardiology clinic consults (F2F) between 6 January 2020 until 13 March 2020 vs virtual between 16 March until 22 April 2020)         |                                                        |                      |
|                                      |                                  | n=691                                                                                                                                                | n=1644                                                 |                      |
| Retrospective cohort                 | Blood tests                      | 15%                                                                                                                                                  | 20%                                                    | -5%                  |
|                                      | Imaging                          | 18%                                                                                                                                                  | 31%                                                    | -13%                 |
|                                      | Referral to specialists          | 4%                                                                                                                                                   | 1%                                                     | +3%                  |
| <b>Schulze 2021 (USA)</b>            | Population/setting               | Low back pain patients (n=542) in Veterans Affairs hospital outpatient clinic                                                                        |                                                        |                      |
|                                      |                                  | n=115                                                                                                                                                | n=427                                                  |                      |
| Retrospective cohort (abstract only) | Neurosurgery referrals           | 12%                                                                                                                                                  | 3% (p<0.01)                                            | +9%                  |
|                                      | Imaging                          | 25%                                                                                                                                                  | 29% (p=0.5)                                            | -4%                  |

\* positive numbers indicate increase in referrals; negative numbers indicate decrease in referrals.

## Results for Question B2. Selected outcomes of interest: Effects of Telehealth vs face-to-face consultations on economic impacts

We identified 3 reviews to answer this question: Snoswell 2020, Batalik 2023, and Avidor 2020.

### Scoping review by Snoswell 2020

The scoping review by Snoswell 2020 searched for studies investigating whether telehealth reduces health system costs compared with traditional service models, and to identify the scenarios in which cost-savings might be realised. Initially, literature searches were conducted using broad terms to identify economic evaluation literature in telehealth. The investigators then conducted an expert focus group to identify domains where telehealth might reduce health system costs, followed by further targeted literature searches. Searches were conducted to December 2019.

The identified cost analyses suggested that telehealth reduced costs when health system-funded travel was prevented or when telehealth mitigated the need for expensive procedural or specialist follow-up by providing competent care in a more efficient way. They identified 17 cost-minimization studies from the perspective of the health system, of which 9 studies found telehealth to be cost-saving compared with conventional care, 6 studies reported telehealth to be cost-saving after a workload threshold was achieved, and 2 studies reported telehealth to be more expensive than conventional care. The most common situation where telehealth reduced health system costs, was when it offset patient or clinician travel that was funded or subsidised by the health system. The expert focus group identified 4 areas of potential savings from telehealth:

- (i) Productivity gains: mostly from reductions in patient travel and waiting times.
- (ii) Reductions in secondary care: however, many studies have not demonstrated overall cost-savings due to the cost of administering and monitoring telehealth systems.
- (iii) Alternate funding models: have the potential to save the health system money in situations where the consumers pay out of pocket to receive services.
- (iv) Telementoring: has had minimal economic evaluation. However, in the long term it is likely to result in inadvertent cost-savings through the upskilling of generalist and allied health clinicians.

Telehealth demonstrated great potential for productivity gains arising from health system redesign; however, under the Australian activity-based funding, it is unlikely that these gains will result in cost-savings, except for outpatient consultations where travel reimbursements are mitigated, and the health care provider pays for travel. Secondary care use mitigation is an area of promise for telehealth.

The authors concluded that “the available evidence has indicated that although telehealth provides overwhelmingly positive patient benefits and increases productivity for many services, current evidence suggests that it does not routinely reduce the cost of care delivery for the health system.” (Snoswell 2020)

## **Additional reviews subsequent to Snoswell 2020**

We identified two additional reviews published after the search date of the above scoping review: one in exercise-based cardiac rehabilitation (Batalik 2023), and one in diabetic retinopathy screening (Avidor 2020). The latter used retinal photography for asynchronous assessment, and so is less relevant to the issue of telehealth compared to face-to-face consultation.

The Batalik 2023 systematic review compared the cost-effectiveness of exercise-based telehealth cardiac rehabilitation interventions, with standard exercise-based cardiac rehabilitation. The authors systematically searched PubMed and Web of Science databases up to August 2022, to identify randomised controlled trials assessing patients undergoing telehealth cardiac rehabilitation. This identified 12 studies. Compared to clinic-based (face-to-face) cardiac rehabilitation, there were no major differences, except for three studies which found a significant difference in average cost per patient and intervention costs, in favour of telehealth cardiac rehabilitation. The authors concluded that: “Telehealth cardiac rehabilitation based on exercise is as cost-effective as clinic-based [face-to-face] cardiac rehabilitation interventions. Funding telehealth cardiac rehabilitation by third-party payers may promote patient participation to increase overall cardiac rehabilitation utilisation.”

The Avidor 2020 scoping review aimed to examine the most recent published literature on economic evaluations of telehealth for diabetic retinopathy screening programs. The authors systematically searched PubMed, Embase and Google Scholar for relevant articles published between January 2010 and January 2020. Studies were included if the subjects had diabetes, compared a telehealth-based screening for retinopathy with standard care, and undertook an economic evaluation. Seven studies were included (two studies from Canada, and 1 each from the United States, Singapore, India, Brazil and South Africa). All seven studies used a telehealth program which captured and transmitted a retinal image to an ocular imaging centre to assess the severity of diabetic retinopathy. Although telehealth requires initial and maintenance costs, it has the potential to provide significant cost-savings by increasing patients' working ability, and reducing travel costs, especially in low-income populations and rural patients with high transportation costs.

## **References**

1. Snoswell CL, Taylor ML, Comans TA, Smith AC, Gray LC, Caffery LJ. Determining if Telehealth Can Reduce Health System Costs: Scoping Review. *J Med Internet Res*. 2020 Oct 19;22(10):e17298. doi: 10.2196/17298. PMID: 33074157; PMCID: PMC7605980.
2. Batalik, L., Filakova, K., Pepera, G., et al. The cost-effectiveness of exercise-based cardiac telerehabilitation intervention: a systematic review. *Eur J Phys Rehabil Med*. 2023
3. Avidor, D., Loewenstein, A., Nutman, A., et al. Cost-effectiveness of diabetic retinopathy screening programs using telemedicine: A systematic review. *Cost Effectiveness and Resource Allocation*. 2020; 18(1) *Eur J Phys Rehabil Med*. . 2023 Jan 24. doi: 10.23736/S1973-9087.23.07773-0.

## Discussion

This review aimed both to update the findings of the previous review, and to expand its scope with several topics identified as of interest by the Department. The conclusions in the first report were, briefly, that telehealth – either by videoconferencing or teleconferencing – appears to provide equivalent clinical outcomes for many types of clinical encounter, particularly for ongoing clinical care. For initial diagnosis, telehealth has some limitations, in particular where physical examination is required as part of the diagnostic process. While visual examination can be carried out via videoconferencing, this appears generally less satisfactory (less reliable and accurate) than examination face-to-face; and hands-on physical examination is limited to self-examination or some examination by carers. For continuing care for management of an established diagnoses, telehealth appears equivalent for most clinical outcomes, has similar cost to health services, increases convenience and access for patients, which is particularly important for rural patients and patients who have difficulty travelling to clinical appointments.

This Work Package aimed to address two questions: **(1) Specialist services:** to identify the evidence comparing telehealth (by video or phone) to face-to-face provision of care in specialist areas, e.g. psychiatric services, cardiac, genetics, etc. **(2) Selected outcomes of interest:** to identify the evidence for critical questions, which may lack randomised controlled trial evidence, i.e., a) referrals to imaging/pathology, and b) economic impacts of telehealth.

In general, telehealth has been more extensively studied for secondary care than for primary care, but these studies often focused on very specific clinical conditions and situations. A summary of the main findings of the present review are:

- 1. Effectiveness of Telehealth in Specialist Care.** Over 50 systematic reviews studied the effectiveness of telehealth in secondary care, addressing questions across a wide variety of clinical conditions and modalities. These reviews usually address two separate questions: (i) use of telehealth *as an add-on service*, to provide additional clinical input for patient studied; (ii) use of telehealth to provide *an alternative* to some or all of the traditional face-to-face consultations. Some reviews find that telehealth is at least as – or more – effective than usual care. However, these reviews need to be interpreted cautiously as “usual care” was often not clearly defined and most typically telehealth was being provided as an additional service, providing additional treatment or follow up. For those studies that examined telehealth (or a hybrid) versus face-to-face as a substitution, most found comparable effectiveness, consistent with our findings in primary care.
- 2. Impact of telehealth on referral for imaging/pathology.** We could not find any trials that provided information on differential rates of referral between telehealth and face-to-face consultation. Hence, we searched for observational studies that addressed this question. However, these observational studies will be biased by the conditions under which telehealth was chosen. The few studies that exist, show mixed results with no clear trend, but this may warrant further examination.



- 3. Economic or cost-economic outcomes.** There were a number of reviews of the economics of telehealth. As with primary care, the main finding was that telehealth is generally equivalent in cost, but sometimes cost-saving (often from a societal perspective), because of reductions in travel time and time off work, for either the patient or the healthcare worker. There are some possibilities for service redesign using telehealth, but these are unlikely to be adopted under Australia's fee-for-service models, though some options exist within public hospitals' activity-based funding. Finally, we note that the economic studies do not assess the impact of increased access to telehealth by patients who might previously not have accessed healthcare services.

There are several limitations to our findings. First, the telehealth trials identified are limited to a small percent of all conditions and consultation types, so the results may not apply to all circumstances. Of particular note is that many of the studies are with patients with an established diagnosis. Second, we are limited to the outcomes that were measured and reported in the studies, which do not cover all the topics of interest, e.g., changes in test ordering or referral. Third, many of the studies were conducted prior to 2012 – before smartphones were in widespread use – and used a special video call devices installed in patients' homes, which would pose a challenge for scalability of the intervention. However, with the increasing ownership of personal smartphones, video communications have become more accessible. Finally, a related issue is the "learning curve" for telehealth. Prior to the pandemic telehealth was uncommon, and hence clinical experience was limited. This has changed, and clinicians are likely to have learned and adapted to using telehealth. The literature on telehealth is clearly growing rapidly, and worth periodically monitoring. These reviews provide a good basis for where telehealth is and is not clinically effective, but there are also significant gaps that warrant further primary research and synthesis.

## Appendix 1 – PRISMA-Scoping Review Reporting Checklist

PRISMA-ScR checklist for Question B1

| SECTION                           | ITEM | PRISMA-ScR CHECKLIST ITEM                                                                                                                                                                                                                                                                                  | REPORTED ON PAGE #                                   |
|-----------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <b>TITLE</b>                      |      |                                                                                                                                                                                                                                                                                                            |                                                      |
| Title                             | 1    | Identify the report as a scoping review.                                                                                                                                                                                                                                                                   | Introduction + Methods                               |
| <b>ABSTRACT</b>                   |      |                                                                                                                                                                                                                                                                                                            |                                                      |
| Structured summary                | 2    | Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.                                                                              | Executive Summary section                            |
| <b>INTRODUCTION</b>               |      |                                                                                                                                                                                                                                                                                                            |                                                      |
| Rationale                         | 3    | Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.                                                                                                                                   | Introduction                                         |
| Objectives                        | 4    | Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.                                  | Introduction                                         |
| <b>METHODS</b>                    |      |                                                                                                                                                                                                                                                                                                            |                                                      |
| Protocol and registration         | 5    | Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.                                                                                                             | Methods                                              |
| Eligibility criteria              | 6    | Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.                                                                                                                                       | Methods / eligibility criteria section               |
| Information sources*              | 7    | Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.                                                                                                  | Methods / search strategies section                  |
| Search                            | 8    | Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.                                                                                                                                                                            | Appendix 2                                           |
| Selection of sources of evidence† | 9    | State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.                                                                                                                                                                                      | Methods / study selection section                    |
| Data charting process‡            | 10   | Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators. | Methods / data extraction and data analysis sections |
| Data items                        | 11   | List and define all variables for which data were sought and any assumptions and simplifications made.                                                                                                                                                                                                     | Methods / data extraction and data analysis sections |

| SECTION                                               | ITEM | PRISMA-ScR CHECKLIST ITEM                                                                                                                                                                             | REPORTED ON PAGE #                  |
|-------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Critical appraisal of individual sources of evidence§ | 12   | If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate). | n/a                                 |
| Synthesis of results                                  | 13   | Describe the methods of handling and summarizing the data that were charted.                                                                                                                          | Methods / data analysis sections    |
| <b>RESULTS</b>                                        |      |                                                                                                                                                                                                       |                                     |
| Selection of sources of evidence                      | 14   | Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.                          | Appendix 5 – PRISMA flow charts     |
| Characteristics of sources of evidence                | 15   | For each source of evidence, present characteristics for which data were charted and provide the citations.                                                                                           | Results section                     |
| Critical appraisal within sources of evidence         | 16   | If done, present data on critical appraisal of included sources of evidence (see item 12).                                                                                                            | n/a                                 |
| Results of individual sources of evidence             | 17   | For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.                                                                 | Results section                     |
| Synthesis of results                                  | 18   | Summarize and/or present the charting results as they relate to the review questions and objectives.                                                                                                  | Results section + Executive Summary |
| <b>DISCUSSION</b>                                     |      |                                                                                                                                                                                                       |                                     |
| Summary of evidence                                   | 19   | Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.       | Results section + Executive Summary |
| Limitations                                           | 20   | Discuss the limitations of the scoping review process.                                                                                                                                                | Results section + Executive Summary |
| Conclusions                                           | 21   | Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.                                             | Executive Summary                   |
| <b>FUNDING</b>                                        |      |                                                                                                                                                                                                       |                                     |
| Funding                                               | 22   | Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.                       | Appendix 8                          |

PRISMA-ScR checklist for Question B2

| SECTION                           | ITEM | PRISMA-ScR CHECKLIST ITEM                                                                                                                                                                                                                                                                                  | REPORTED ON PAGE #                                   |
|-----------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <b>TITLE</b>                      |      |                                                                                                                                                                                                                                                                                                            |                                                      |
| Title                             | 1    | Identify the report as a scoping review.                                                                                                                                                                                                                                                                   | Introduction + Methods                               |
| <b>ABSTRACT</b>                   |      |                                                                                                                                                                                                                                                                                                            |                                                      |
| Structured summary                | 2    | Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.                                                                              | Executive Summary section                            |
| <b>INTRODUCTION</b>               |      |                                                                                                                                                                                                                                                                                                            |                                                      |
| Rationale                         | 3    | Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.                                                                                                                                   | Introduction                                         |
| Objectives                        | 4    | Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.                                  | Introduction                                         |
| <b>METHODS</b>                    |      |                                                                                                                                                                                                                                                                                                            |                                                      |
| Protocol and registration         | 5    | Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.                                                                                                             | Methods                                              |
| Eligibility criteria              | 6    | Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.                                                                                                                                       | Methods / eligibility criteria section               |
| Information sources*              | 7    | Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.                                                                                                  | Methods / search strategies section                  |
| Search                            | 8    | Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.                                                                                                                                                                            | Appendix 3 & 4                                       |
| Selection of sources of evidence† | 9    | State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.                                                                                                                                                                                      | Methods / study selection section                    |
| Data charting process‡            | 10   | Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators. | Methods / data extraction and data analysis sections |
| Data items                        | 11   | List and define all variables for which data were sought and any assumptions and simplifications made.                                                                                                                                                                                                     | Methods / data extraction and data analysis sections |
| Critical appraisal of individual  | 12   | If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this                                                                                                                                                                   | n/a                                                  |

| SECTION                                       | ITEM | PRISMA-ScR CHECKLIST ITEM                                                                                                                                                                       | REPORTED ON PAGE #                  |
|-----------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| sources of evidence§                          |      | information was used in any data synthesis (if appropriate).                                                                                                                                    |                                     |
| Synthesis of results                          | 13   | Describe the methods of handling and summarizing the data that were charted.                                                                                                                    | Methods / data analysis sections    |
| <b>RESULTS</b>                                |      |                                                                                                                                                                                                 |                                     |
| Selection of sources of evidence              | 14   | Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.                    | Appendix 5 – PRISMA flow charts     |
| Characteristics of sources of evidence        | 15   | For each source of evidence, present characteristics for which data were charted and provide the citations.                                                                                     | Results section                     |
| Critical appraisal within sources of evidence | 16   | If done, present data on critical appraisal of included sources of evidence (see item 12).                                                                                                      | n/a                                 |
| Results of individual sources of evidence     | 17   | For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.                                                           | Results section                     |
| Synthesis of results                          | 18   | Summarize and/or present the charting results as they relate to the review questions and objectives.                                                                                            | Results section + Executive Summary |
| <b>DISCUSSION</b>                             |      |                                                                                                                                                                                                 |                                     |
| Summary of evidence                           | 19   | Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups. | Results section + Executive Summary |
| Limitations                                   | 20   | Discuss the limitations of the scoping review process.                                                                                                                                          | Results section + Executive Summary |
| Conclusions                                   | 21   | Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.                                       | Executive Summary                   |
| <b>FUNDING</b>                                |      |                                                                                                                                                                                                 |                                     |
| Funding                                       | 22   | Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.                 | Appendix 8                          |

## **Appendix 2 – Search strategies for Question B1. Specialist services: To identify the evidence comparing telehealth (by video or phone) to face-to-face provision of care in specialist areas, e.g. psychiatric services, cardiac, genetics, etc.**

**All searches were run from inception of each database or registry, to 14/02/2023**

### **Randomised controlled trial searches**

#### **PubMed**

("Telemedicine"[Mesh] OR "Videoconferencing"[Mesh] OR Telehealth[tiab] OR Telemedicine[tiab] OR Videoconferencing[tiab] OR ((Telephone[tiab] AND (Consultation[tiab] OR face-to-face[tiab] OR in-person[tiab])) OR telephone-delivered[tiab])

AND

("Primary Health Care"[Mesh] OR "General Practice"[Mesh] OR rehabilitation[sh] OR "Outpatients"[Mesh] OR "Speech Therapy"[Mesh] OR "Physicians"[Mesh] OR Outpatient[tiab] OR "Primary health"[tiab] OR "Primary care"[tiab] OR "General practice"[tiab] OR "General practices"[tiab] OR "General practitioners"[tiab] OR "General practitioner"[tiab] OR "Family practice"[tiab] OR Physician[tiab] OR Physicians[tiab] OR Clinician[tiab] OR Clinicians[tiab] OR Therapist[tiab] OR Nurse[tiab] OR Nurses[tiab] OR Physiotherapist[tiab] OR Rehabilitation[tiab] OR Diabetes[tiab] OR Diabetic[tiab] OR Asthma[tiab] OR Depression[tiab] OR "Irritable bowel"[tiab] OR IBS[tiab] OR PTSD[tiab] OR "Chronic fatigue"[tiab] OR Psychiatry[tiab] OR Psychiatrist[tiab] OR Surgical[tiab] OR Surgery[tiab] OR Surgeon[tiab] OR Oncologist[tiab] OR Oncology[tiab] OR Cardiologist[tiab] OR Cardiology[tiab] OR Obstetrician[tiab] OR Obstetrics[tiab] OR Gynaecologist[tiab] OR Gynaecology[tiab] OR Gynecologist[tiab] OR Gynecology[tiab] OR Dermatologist[tiab] OR Dermatology[tiab])

AND

((Face to face[tiab]) OR "Usual care"[tiab] OR Visits[tiab] OR Visit[tiab] OR In-person[tiab] OR "In person"[tiab] OR ((Clinic[tiab] OR Centre[tiab] OR Home[tiab]) AND (Based[tiab] OR Contact[tiab])) OR Conventional[tiab] OR "Practice-based"[tiab] OR "Practice based"[tiab] OR Traditional[tiab] OR "Standard care"[tiab] OR Homecare[tiab] OR ((Routine[tiab] OR Home[tiab]) AND (Care[tiab])))

AND

("Delivery of Health Care"[Mesh] OR Delivery[tiab] OR Delivered[tiab] OR Via[tiab] OR Received[tiab])

AND

("Treatment Outcome"[Mesh] OR "Patient Satisfaction"[Mesh] OR Therapy[sh] OR Diagnosis[sh] OR "Clinical outcomes"[tiab] OR Treatment[tiab] OR Diagnostic[tiab] OR Efficacy[tiab])

AND

(Randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR randomised[tiab] OR placebo[tiab] OR "drug therapy"[sh] OR randomly[tiab] OR trial[tiab] OR groups[tiab])

NOT

(Animals[Mesh] not (Animals[Mesh] and Humans[Mesh]))

NOT

("Case Reports"[pt] OR Editorial[pt] OR Letter[pt] OR Meta-Analysis[pt] OR "Observational Study"[pt] OR "Systematic Review"[pt] OR "Case Report"[ti] OR "Case series"[ti] OR Meta-Analysis[ti] OR "Meta Analysis"[ti] OR "Systematic Review"[ti] OR "Systematic Literature Review"[ti] OR "Qualitative study"[ti] OR Protocol[ti])

## **CENTRAL**

([mh Telemedicine] OR [mh Videoconferencing] OR Telehealth:ti,ab OR Telemedicine:ti,ab OR Videoconferencing:ti,ab OR ((Telephone:ti,ab) AND (Consultation:ti,ab OR "face to face":ti,ab OR "in person":ti,ab)) OR "telephone delivered":ti,ab)

AND

([mh "Primary Health Care"] OR [mh "General Practice"] OR [mh /RH] OR [mh Outpatients] OR [mh "Speech Therapy"] OR [mh Physicians] OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR "Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab OR Psychiatry:ti,ab OR Psychiatrist:ti,ab OR Surgical:ti,ab OR Surgery:ti,ab OR Surgeon:ti,ab OR Oncologist:ti,ab OR Oncology:ti,ab OR Cardiologist:ti,ab OR Cardiology:ti,ab OR Obstetrician:ti,ab OR Obstetrics:ti,ab OR Gynaecologist:ti,ab OR Gynaecology:ti,ab OR Gynecologist:ti,ab OR Gynecology:ti,ab OR Dermatologist:ti,ab OR Dermatology:ti,ab)

AND

("Face to face":ti,ab OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR "In person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR Conventional:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab)))

AND

([mh "Delivery of Health Care"] OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)

AND

([mh "Treatment Outcome"] OR [mh "Patient Satisfaction"] OR "Clinical outcomes":ti,ab OR Treatment:ti,ab OR Diagnostic:ti,ab OR Efficacy:ti,ab)

## **Embase**

('Telemedicine'/exp OR 'Videoconferencing'/exp OR Telehealth:ti,ab OR Telemedicine:ti,ab OR Videoconferencing:ti,ab OR ((Telephone:ti,ab) AND (Consultation:ti,ab OR face-to-face:ti,ab OR in-person:ti,ab)) OR telephone-delivered:ti,ab)

AND

('Primary Health Care'/exp OR 'General Practice'/exp OR 'Outpatient'/exp OR 'Speech Therapy'/exp OR Physician/exp OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR "Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab OR Psychiatry:ti,ab OR Psychiatrist:ti,ab OR Surgical:ti,ab OR Surgery:ti,ab OR Surgeon:ti,ab OR Oncologist:ti,ab OR Oncology:ti,ab OR Cardiologist:ti,ab OR Cardiology:ti,ab OR Obstetrician:ti,ab OR Obstetrics:ti,ab OR Gynaecologist:ti,ab OR Gynaecology:ti,ab OR Gynecologist:ti,ab OR Gynecology:ti,ab OR Dermatologist:ti,ab OR Dermatology:ti,ab)

AND

("Face to face":ti,ab OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR In-person:ti,ab OR "In person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR Conventional:ti,ab OR Practice-based:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab)))

AND

('health care delivery'/exp OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)

AND

('Treatment Outcome'/exp OR 'Patient Satisfaction'/exp OR "Clinical outcomes":ti,ab OR Treatment:ti,ab OR Diagnostic:ti,ab OR Efficacy:ti,ab)

AND

(random\* OR factorial OR crossover OR placebo OR blind OR blinded OR assign OR assigned OR allocate OR allocated OR 'crossover procedure'/exp OR 'double-blind procedure'/exp OR 'randomized controlled trial'/exp OR 'single-blind procedure'/exp NOT ('animal'/exp NOT ('animal'/exp AND 'human'/exp)))

AND [embase]/lim

## **Systematic Review searches**

### **PubMed**

("Telemedicine"[Mesh] OR "Videoconferencing"[Mesh] OR Telehealth[tiab] OR Telemedicine[tiab] OR Videoconferencing[tiab] OR ((Telephone[tiab]) AND (Consultation[tiab] OR face-to-face[tiab] OR in-person[tiab])) OR telephone-delivered[tiab])

AND

("Primary Health Care"[Mesh] OR "General Practice"[Mesh] OR rehabilitation[sh] OR "Outpatients"[Mesh] OR "Speech Therapy"[Mesh] OR "Physicians"[Mesh] OR Outpatient[tiab] OR "Primary health"[tiab] OR "Primary care"[tiab] OR "General practice"[tiab] OR "General practices"[tiab] OR "General practitioners"[tiab] OR "General practitioner"[tiab] OR "Family practice"[tiab] OR Physician[tiab] OR Physicians[tiab] OR Clinician[tiab] OR Clinicians[tiab] OR Therapist[tiab] OR Nurse[tiab] OR Nurses[tiab] OR Physiotherapist[tiab] OR Rehabilitation[tiab] OR Diabetes[tiab] OR Diabetic[tiab] OR Asthma[tiab] OR Depression[tiab] OR "Irritable bowel"[tiab] OR IBS[tiab] OR PTSD[tiab] OR "Chronic fatigue"[tiab] OR Psychiatry[tiab] OR Psychiatrist[tiab] OR Surgical[tiab] OR Surgery[tiab] OR Surgeon[tiab] OR Oncologist[tiab] OR Oncology[tiab] OR Cardiologist[tiab] OR Cardiology[tiab] OR Obstetrician[tiab] OR Obstetrics[tiab] OR Gynaecologist[tiab] OR Gynaecology[tiab] OR Gynecologist[tiab] OR Gynecology[tiab] OR Dermatologist[tiab] OR Dermatology[tiab])

AND

((Face to face[tiab]) OR "Usual care"[tiab] OR Visits[tiab] OR Visit[tiab] OR In-person[tiab] OR "In person"[tiab] OR ((Clinic[tiab] OR Centre[tiab] OR Home[tiab]) AND (Based[tiab] OR Contact[tiab])) OR Conventional[tiab] OR "Practice-based"[tiab] OR "Practice based"[tiab] OR Traditional[tiab] OR "Standard care"[tiab] OR Homecare[tiab] OR ((Routine[tiab] OR Home[tiab]) AND (Care[tiab])))

AND

("Delivery of Health Care"[Mesh] OR Delivery[tiab] OR Delivered[tiab] OR Via[tiab] OR Received[tiab])

AND

("Treatment Outcome"[Mesh] OR "Patient Satisfaction"[Mesh] OR Therapy[sh] OR Diagnosis[sh] OR "Clinical outcomes"[tiab] OR Treatment[tiab] OR Diagnostic[tiab] OR Efficacy[tiab])

AND

(Meta-Analysis[pt] OR "Systematic Review"[pt] OR Meta-Analysis[ti] OR "Meta Analysis"[ti] OR "Systematic Review"[ti] OR "Systematic Literature Review"[ti])

NOT

("Case Reports"[pt] OR Editorial[pt] OR Letter[pt] OR "Observational Study"[pt] OR "Case Report"[ti] OR "Case series"[ti] OR "Qualitative study"[ti] OR Protocol[ti])



## **Cochrane Database of Systematic Reviews (CDSR) via the Cochrane Library**

([mh Telemedicine] OR [mh Videoconferencing] OR Telehealth:ti,ab OR Telemedicine:ti,ab OR Videoconferencing:ti,ab OR ((Telephone:ti,ab) AND (Consultation:ti,ab OR "face to face":ti,ab OR "in person":ti,ab)) OR "telephone delivered":ti,ab)

AND

([mh "Primary Health Care"] OR [mh "General Practice"] OR [mh /RH] OR [mh Outpatients] OR [mh "Speech Therapy"] OR [mh Physicians] OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR "Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab OR Psychiatry:ti,ab OR Psychiatrist:ti,ab OR Surgical:ti,ab OR Surgery:ti,ab OR Surgeon:ti,ab OR Oncologist:ti,ab OR Oncology:ti,ab OR Cardiologist:ti,ab OR Cardiology:ti,ab OR Obstetrician:ti,ab OR Obstetrics:ti,ab OR Gynaecologist:ti,ab OR Gynaecology:ti,ab OR Gynecologist:ti,ab OR Gynecology:ti,ab OR Dermatologist:ti,ab OR Dermatology:ti,ab)

AND

("Face to face":ti,ab OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR "In person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR Conventional:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab)))

AND

([mh "Delivery of Health Care"] OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)

AND

([mh "Treatment Outcome"] OR [mh "Patient Satisfaction"] OR "Clinical outcomes":ti,ab OR Treatment:ti,ab OR Diagnostic:ti,ab OR Efficacy:ti,ab)

## **Embase**

('Telemedicine'/exp OR 'Videoconferencing'/exp OR Telehealth:ti,ab OR Telemedicine:ti,ab OR Videoconferencing:ti,ab OR ((Telephone:ti,ab) AND (Consultation:ti,ab OR face-to-face:ti,ab OR in-person:ti,ab)) OR telephone-delivered:ti,ab)

AND

('Primary Health Care'/exp OR 'General Practice'/exp OR 'Outpatient'/exp OR 'Speech Therapy'/exp OR Physician/exp OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR "Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab OR Psychiatry:ti,ab OR Psychiatrist:ti,ab OR Surgical:ti,ab OR Surgery:ti,ab OR Surgeon:ti,ab OR Oncologist:ti,ab OR Oncology:ti,ab OR Cardiologist:ti,ab OR Cardiology:ti,ab OR Obstetrician:ti,ab OR Obstetrics:ti,ab OR Gynaecologist:ti,ab OR Gynaecology:ti,ab OR Gynecologist:ti,ab OR Gynecology:ti,ab OR Dermatologist:ti,ab OR Dermatology:ti,ab)

AND

("Face to face":ti,ab OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR In-person:ti,ab OR "In person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR Conventional:ti,ab OR Practice-based:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab)))

AND

('health care delivery'/exp OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)

AND

('Treatment Outcome'/exp OR 'Patient Satisfaction'/exp OR "Clinical outcomes":ti,ab OR Treatment:ti,ab OR Diagnostic:ti,ab OR Efficacy:ti,ab)

AND

([cochrane review]/lim OR [systematic review]/lim OR [meta analysis]/lim OR ((Search:ti,ab OR Searched:ti,ab) AND (PubMed:ti,ab OR MEDLINE:ti,ab)) OR (Systematic:ti,ab AND Review:ti,ab) OR 'Meta analysis':ti,ab OR Meta-analysis:ti,ab OR Review:ti OR ((Systematically:ti,ab OR Reviewed:ti,ab) AND (literature:ti,ab)))

## Appendix 3 – Search strategies for Question B2: Selected outcomes of interest: Effects of Telehealth vs face-to-face consultations on referral to imaging/pathology

All searches were run from inception of each database or registry, to 28/03/2023

### Observational studies searches

#### PubMed

("Telemedicine"[Mesh] OR "Videoconferencing"[Mesh] OR Telehealth[tiab] OR Telemedicine[tiab] OR Videoconferencing[tiab] OR "Telephone delivered" OR Telephone-delivered[tiab])

AND

("Primary Health Care"[Mesh] OR "General Practice"[Mesh] OR rehabilitation[sh] OR "Outpatients"[Mesh] OR "Speech Therapy"[Mesh] OR Outpatient[tiab] OR "Primary health"[tiab] OR "Primary care"[tiab] OR "General practice"[tiab] OR "General practices"[tiab] OR "General practitioners"[tiab] OR "General practitioner"[tiab] OR "Family practice"[tiab] OR Physician[tiab] OR Physicians[tiab] OR Clinician[tiab] OR Clinicians[tiab] OR Therapist[tiab] OR Nurse[tiab] OR Nurses[tiab] OR Physiotherapist[tiab] OR Rehabilitation[tiab] OR Diabetes[tiab] OR Diabetic[tiab] OR Asthma[tiab] OR Depression[tiab] OR "Irritable bowel"[tiab] OR IBS[tiab] OR PTSD[tiab] OR "Chronic fatigue"[tiab])

AND

((Face to face[tiab]) OR "Usual care"[tiab] OR Visits[tiab] OR Visit[tiab] OR In-person[tiab] OR "In person"[tiab] OR ((Clinic[tiab] OR Centre[tiab] OR Home[tiab]) AND (Based[tiab] OR Contact[tiab])) OR Conventional[tiab] OR "Practice-based"[tiab] OR "Practice based"[tiab] OR Traditional[tiab] OR "Standard care"[tiab] OR Homecare[tiab] OR ((Routine[tiab] OR Home[tiab]) AND (Care[tiab])))

AND

("Delivery of Health Care"[Mesh] OR Delivery[tiab] OR Delivered[tiab] OR Via[tiab] OR Received[tiab])

AND

("Referral and Consultation"[Mesh] OR Referral OR Referrals OR Consults[tiab] OR Consultations[tiab])

AND

("Diagnostic Imaging"[Mesh] OR "Pathology"[Mesh] OR Diagnostic[tiab] OR Imaging[tiab] OR Pathology[tiab])

AND

("Epidemiologic Studies"[Mesh] OR "case-control studies"[Mesh] OR "Cohort Studies"[Mesh] OR "case control"[tiab] OR Cohort[tiab] OR "Follow up"[tiab] OR Observational[tiab] OR Longitudinal[tiab] OR Prospective[tiab] OR retrospective[tiab] OR "cross sectional"[tiab] OR "Cross-Sectional Studies"[Mesh] OR Investigated[tiab] OR Evaluated[tiab] OR Impact[tiab] OR Analysis[tiab] OR Statistics[tiab] OR Data[tiab] OR "statistics and numerical data"[sh] OR "epidemiology"[sh])

## **CENTRAL**

([mh Telemedicine] OR [mh Videoconferencing] OR Telehealth:ti,ab OR Telemedicine:ti,ab OR Videoconferencing:ti,ab OR "telephone delivered":ti,ab)

AND

([mh "Primary Health Care"] OR [mh "General Practice"] OR [mh Outpatients] OR [mh "Speech Therapy"] OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR "Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab)

AND

((("Face to face":ti,ab) OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR "In person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR Conventional:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab))))

AND

([mh "Delivery of Health Care"] OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)

AND

([mh "Referral and Consultation"] OR Referral OR Referrals OR Consults:ti,ab OR Consultations:ti,ab)

AND

([mh "Diagnostic Imaging"] OR [mh Pathology] OR Diagnostic:ti,ab OR Imaging:ti,ab OR Pathology:ti,ab)

## **Embase**

('Telemedicine'/exp/mj OR 'Videoconferencing'/exp/mj OR Telehealth:ti,ab OR Telemedicine:ti,ab OR Videoconferencing:ti,ab OR Telephone-delivered:ti,ab)

AND

('Primary Health Care'/exp/mj OR 'General Practice'/exp/mj OR 'Outpatient'/exp/mj OR 'Speech Therapy'/exp/mj OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR "Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab)

AND

((("Face to face":ti,ab) OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR In-person:ti,ab OR "In person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR Conventional:ti,ab OR Practice-based:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab))))

AND

('health care delivery'/exp/mj OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)

AND

('Referral and Consultation'/exp/mj OR Referral OR Referrals OR Consults:ti,ab OR Consultations:ti,ab)

AND

('Diagnostic Imaging'/exp/mj OR Pathology/exp/mj OR Diagnostic:ti,ab OR Imaging:ti,ab OR Pathology:ti,ab)

AND

('epidemiology'/exp OR 'case control study'/exp OR 'cohort analysis'/exp OR 'cross-sectional study'/exp OR "case control":ti,ab OR (cohort NEAR/1 (study or studies)):ti,ab OR ("cohort analysis"):ti,ab OR ("follow up" NEAR/1 (study or studies)):ti,ab OR (observational NEAR/1 (study or studies)):ti,ab OR longitudinal:ti,ab OR retrospective:ti,ab OR "cross sectional":ti,ab) NOT ('animal'/exp NOT ('animal'/exp AND 'human'/exp))

## Systematic review searches

### PubMed

("Telemedicine"[Mesh] OR "Videoconferencing"[Mesh] OR Telehealth[tiab] OR Telemedicine[tiab] OR Videoconferencing[tiab] OR "Telephone delivered"[tiab] OR telephone-delivered[tiab])

AND

("Primary Health Care"[Mesh] OR "General Practice"[Mesh] OR rehabilitation[sh] OR "Outpatients"[Mesh] OR "Speech Therapy"[Mesh] OR Outpatient[tiab] OR "Primary health"[tiab] OR "Primary care"[tiab] OR "General practice"[tiab] OR "General practices"[tiab] OR "General practitioners"[tiab] OR "General practitioner"[tiab] OR "Family practice"[tiab] OR Physician[tiab] OR Physicians[tiab] OR Clinician[tiab] OR Clinicians[tiab] OR Therapist[tiab] OR Nurse[tiab] OR Nurses[tiab] OR Physiotherapist[tiab] OR Rehabilitation[tiab] OR Diabetes[tiab] OR Diabetic[tiab] OR Asthma[tiab] OR Depression[tiab] OR "Irritable bowel"[tiab] OR IBS[tiab] OR PTSD[tiab] OR "Chronic fatigue"[tiab])

AND

((Face to face[tiab]) OR "Usual care"[tiab] OR Visits[tiab] OR Visit[tiab] OR In-person[tiab] OR "In person"[tiab] OR ((Clinic[tiab] OR Centre[tiab] OR Home[tiab]) AND (Based[tiab] OR Contact[tiab])) OR Conventional[tiab] OR "Practice-based"[tiab] OR "Practice based"[tiab] OR Traditional[tiab] OR "Standard care"[tiab] OR Homecare[tiab] OR ((Routine[tiab] OR Home[tiab]) AND (Care[tiab])))

AND

("Delivery of Health Care"[Mesh] OR Delivery[tiab] OR Delivered[tiab] OR Via[tiab] OR Received[tiab])

AND

("Referral and Consultation"[Mesh] OR Referral OR Referrals OR Consults[tiab] OR Consultations[tiab])

AND

("Diagnostic Imaging"[Mesh] OR "Pathology"[Mesh] OR Diagnostic[tiab] OR Imaging[tiab] OR Pathology[tiab])

AND

(Meta-Analysis[pt] OR "Systematic Review"[pt] OR Meta-Analysis[ti] OR "Meta Analysis"[ti] OR "Systematic Review"[ti] OR "Systematic Literature Review"[ti])

NOT

("Case Reports"[pt] OR Editorial[pt] OR Letter[pt] OR "Observational Study"[pt] OR "Case Report"[ti] OR "Case series"[ti] OR "Qualitative study"[ti] OR Protocol[ti])

### Cochrane Database of Systematic Reviews (CDSR) via the Cochrane Library

([mh Telemedicine] OR [mh Videoconferencing] OR Telehealth:ti,ab OR Telemedicine:ti,ab OR Videoconferencing:ti,ab OR "telephone delivered":ti,ab)

AND

([mh "Primary Health Care"] OR [mh "General Practice"] OR [mh Outpatients] OR [mh "Speech Therapy"] OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR "Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab)

AND

((("Face to face":ti,ab) OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR "In person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR Conventional:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab))))

AND

([mh "Delivery of Health Care"] OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)  
AND  
([mh "Referral and Consultation"] OR Referral OR Referrals OR Consults:ti,ab OR Consultations:ti,ab)  
AND  
([mh "Diagnostic Imaging"] OR [mh Pathology] OR Diagnostic:ti,ab OR Imaging:ti,ab OR  
Pathology:ti,ab)

### **Embase**

('Telemedicine'/exp/mj OR 'Videoconferencing'/exp/mj OR Telehealth:ti,ab OR Telemedicine:ti,ab OR  
Videoconferencing:ti,ab OR Telephone-delivered:ti,ab)  
AND  
( 'Primary Health Care'/exp/mj OR 'General Practice'/exp/mj OR 'Outpatient'/exp/mj OR 'Speech  
Therapy'/exp/mj OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General  
practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General  
practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab  
OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR  
Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR  
"Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab)  
AND  
(("Face to face":ti,ab) OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR In-person:ti,ab OR "In  
person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR  
Conventional:ti,ab OR Practice-based:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard  
care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab)))  
AND  
( 'health care delivery'/exp/mj OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)  
AND  
( 'Referral and Consultation'/exp/mj OR Referral OR Referrals OR Consults:ti,ab OR Consultations:ti,ab)  
AND  
( 'Diagnostic Imaging'/exp/mj OR Pathology/exp/mj OR Diagnostic:ti,ab OR Imaging:ti,ab OR  
Pathology:ti,ab)  
AND  
([cochrane review]/lim OR [systematic review]/lim OR [meta analysis]/lim OR ((Search:ti,ab OR  
Searched:ti,ab) AND (PubMed:ti,ab OR MEDLINE:ti,ab)) OR (Systematic:ti,ab AND Review:ti,ab) OR  
'Meta analysis':ti,ab OR Meta-analysis:ti,ab OR Review:ti OR ((Systematically:ti,ab OR Reviewed:ti,ab)  
AND (literature:ti,ab)))

## Appendix 4 – Search strategies for Question B2: Selected outcomes of interest: Effects of Telehealth vs face-to-face consultations on economic impacts

All searches were run from inception of each database or registry, to 28/3/2023

### Observational studies searches

#### PubMed

("Telemedicine"[Mesh] OR "Videoconferencing"[Mesh] OR Telehealth[tiab] OR Telemedicine[tiab] OR Videoconferencing[tiab] OR "Telephone delivered" OR Telephone-delivered[tiab])

AND

("Primary Health Care"[Mesh] OR "General Practice"[Mesh] OR rehabilitation[sh] OR "Outpatients"[Mesh] OR "Speech Therapy"[Mesh] OR Outpatient[tiab] OR "Primary health"[tiab] OR "Primary care"[tiab] OR "General practice"[tiab] OR "General practices"[tiab] OR "General practitioners"[tiab] OR "General practitioner"[tiab] OR "Family practice"[tiab] OR Physician[tiab] OR Physicians[tiab] OR Clinician[tiab] OR Clinicians[tiab] OR Therapist[tiab] OR Nurse[tiab] OR Nurses[tiab] OR Physiotherapist[tiab] OR Rehabilitation[tiab] OR Diabetes[tiab] OR Diabetic[tiab] OR Asthma[tiab] OR Depression[tiab] OR "Irritable bowel"[tiab] OR IBS[tiab] OR PTSD[tiab] OR "Chronic fatigue"[tiab])

AND

((Face to face[tiab]) OR "Usual care"[tiab] OR Visits[tiab] OR Visit[tiab] OR In-person[tiab] OR "In person"[tiab] OR ((Clinic[tiab] OR Centre[tiab] OR Home[tiab]) AND (Based[tiab] OR Contact[tiab])) OR Conventional[tiab] OR "Practice-based"[tiab] OR "Practice based"[tiab] OR Traditional[tiab] OR "Standard care"[tiab] OR Homecare[tiab] OR ((Routine[tiab] OR Home[tiab]) AND (Care[tiab])))

AND

("Delivery of Health Care"[Mesh] OR Delivery[tiab] OR Delivered[tiab] OR Via[tiab] OR Received[tiab])

AND

("Cost-Benefit Analysis"[Mesh] OR "Cost effectiveness"[tiab] OR "Cost benefit"[tiab] OR "Cost Analysis"[tiab] OR "Cost analyses"[tiab] OR "Productivity gains"[tiab] OR "Productivity gain"[tiab] OR "Potential savings"[tiab] OR Cost[ti] OR Costs[ti])

AND

("Epidemiologic Studies"[Mesh] OR "case-control studies"[Mesh] OR "Cohort Studies"[Mesh] OR "case control"[tiab] OR Cohort[tiab] OR "Follow up"[tiab] OR Observational[tiab] OR Longitudinal[tiab] OR Prospective[tiab] OR retrospective[tiab] OR "cross sectional"[tiab] OR "Cross-Sectional Studies"[Mesh] OR Investigated[tiab] OR Evaluated[tiab] OR Impact[tiab] OR Analysis[tiab] OR Statistics[tiab] OR Data[tiab] OR "statistics and numerical data"[sh] OR "epidemiology"[sh])

## **CENTRAL**

([mh Telemedicine] OR [mh Videoconferencing] OR Telehealth:ti,ab OR Telemedicine:ti,ab OR Videoconferencing:ti,ab OR "telephone delivered":ti,ab)

AND

([mh "Primary Health Care"] OR [mh "General Practice"] OR [mh Outpatients] OR [mh "Speech Therapy"] OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR "Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab)

AND

((("Face to face":ti,ab) OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR "In person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR Conventional:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab))))

AND

([mh "Delivery of Health Care"] OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)

AND

([mh "Cost-Benefit Analysis"] OR "Cost effectiveness":ti,ab OR "Cost benefit":ti,ab OR "Cost Analysis":ti,ab OR "Cost analyses":ti,ab OR "Productivity gains":ti,ab OR "Productivity gain":ti,ab OR "Potential savings":ti,ab OR Cost:ti OR Costs:ti)

## **Embase**

('Telemedicine'/exp/mj OR 'Videoconferencing'/exp/mj OR Telehealth:ti,ab OR Telemedicine:ti,ab OR Videoconferencing:ti,ab OR Telephone-delivered:ti,ab)

AND

('Primary Health Care'/exp/mj OR 'General Practice'/exp/mj OR 'Outpatient'/exp/mj OR 'Speech Therapy'/exp/mj OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR "Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab)

AND

((("Face to face":ti,ab) OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR In-person:ti,ab OR "In person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR Conventional:ti,ab OR Practice-based:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab))))

AND

('health care delivery'/exp/mj OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)

AND

('Cost-Benefit Analysis'/exp/mj OR 'Cost effectiveness':ti,ab OR 'Cost benefit':ti,ab OR 'Cost Analysis':ti,ab OR 'Cost analyses':ti,ab OR 'Productivity gains':ti,ab OR 'Productivity gain':ti,ab OR 'Potential savings':ti,ab OR Cost:ti OR Costs:ti)

AND

('epidemiology'/exp OR 'case control study'/exp OR 'cohort analysis'/exp OR 'cross-sectional study'/exp OR "case control":ti,ab OR (cohort NEAR/1 (study or studies)):ti,ab OR ("cohort analysis"):ti,ab OR ("follow up" NEAR/1 (study or studies)):ti,ab OR (observational NEAR/1 (study or studies)):ti,ab OR



longitudinal:ti,ab OR retrospective:ti,ab OR "cross sectional":ti,ab) NOT ('animal'/exp NOT ('animal'/exp AND 'human'/exp))

## Systematic review searches

### PubMed

("Telemedicine"[Mesh] OR "Videoconferencing"[Mesh] OR Telehealth[tiab] OR Telemedicine[tiab] OR Videoconferencing[tiab] OR "Telephone delivered"[tiab] OR telephone-delivered[tiab])

AND

("Primary Health Care"[Mesh] OR "General Practice"[Mesh] OR rehabilitation[sh] OR "Outpatients"[Mesh] OR "Speech Therapy"[Mesh] OR Outpatient[tiab] OR "Primary health"[tiab] OR "Primary care"[tiab] OR "General practice"[tiab] OR "General practices"[tiab] OR "General practitioners"[tiab] OR "General practitioner"[tiab] OR "Family practice"[tiab] OR Physician[tiab] OR Physicians[tiab] OR Clinician[tiab] OR Clinicians[tiab] OR Therapist[tiab] OR Nurse[tiab] OR Nurses[tiab] OR Physiotherapist[tiab] OR Rehabilitation[tiab] OR Diabetes[tiab] OR Diabetic[tiab] OR Asthma[tiab] OR Depression[tiab] OR "Irritable bowel"[tiab] OR IBS[tiab] OR PTSD[tiab] OR "Chronic fatigue"[tiab])

AND

((Face to face[tiab]) OR "Usual care"[tiab] OR Visits[tiab] OR Visit[tiab] OR In-person[tiab] OR "In person"[tiab] OR ((Clinic[tiab] OR Centre[tiab] OR Home[tiab]) AND (Based[tiab] OR Contact[tiab])) OR Conventional[tiab] OR "Practice-based"[tiab] OR "Practice based"[tiab] OR Traditional[tiab] OR "Standard care"[tiab] OR Homecare[tiab] OR ((Routine[tiab] OR Home[tiab]) AND (Care[tiab])))

AND

("Delivery of Health Care"[Mesh] OR Delivery[tiab] OR Delivered[tiab] OR Via[tiab] OR Received[tiab])

AND

("Cost-Benefit Analysis"[Mesh] OR "Cost effectiveness"[tiab] OR "Cost benefit"[tiab] OR "Cost Analysis"[tiab] OR "Cost analyses"[tiab] OR "Productivity gains"[tiab] OR "Productivity gain"[tiab] OR "Potential savings"[tiab] OR Cost[ti] OR Costs[ti])

AND

(Meta-Analysis[pt] OR "Systematic Review"[pt] OR Meta-Analysis[ti] OR "Meta Analysis"[ti] OR "Systematic Review"[ti] OR "Systematic Literature Review"[ti])

NOT

("Case Reports"[pt] OR Editorial[pt] OR Letter[pt] OR "Observational Study"[pt] OR "Case Report"[ti] OR "Case series"[ti] OR "Qualitative study"[ti] OR Protocol[ti])

### Cochrane Database of Systematic Reviews (CDSR) via the Cochrane Library

[mh Telemedicine] OR [mh Videoconferencing] OR Telehealth:ti,ab OR Telemedicine:ti,ab OR Videoconferencing:ti,ab OR "telephone delivered":ti,ab)

AND

[mh "Primary Health Care"] OR [mh "General Practice"] OR [mh Outpatients] OR [mh "Speech Therapy"] OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR "Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab)

AND

(("Face to face":ti,ab) OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR "In person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR

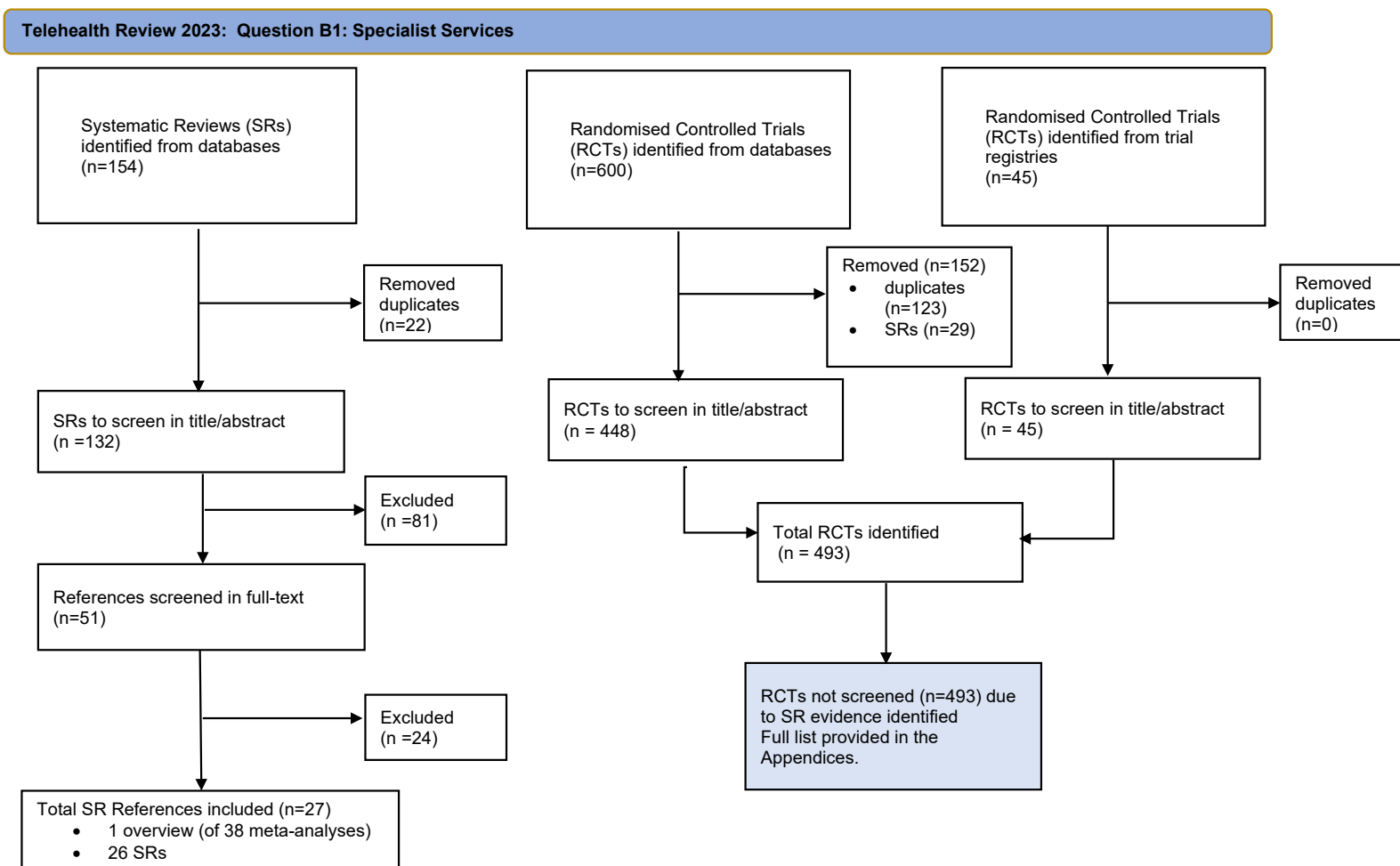
Conventional:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab)))  
AND  
([mh "Delivery of Health Care"] OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)  
AND  
([mh "Cost-Benefit Analysis"] OR "Cost effectiveness":ti,ab OR "Cost benefit":ti,ab OR "Cost Analysis":ti,ab OR "Cost analyses":ti,ab OR "Productivity gains":ti,ab OR "Productivity gain":ti,ab OR "Potential savings":ti,ab OR Cost:ti OR Costs:ti)

### **Embase**

('Telemedicine'/exp/mj OR 'Videoconferencing'/exp/mj OR Telehealth:ti,ab OR Telemedicine:ti,ab OR Videoconferencing:ti,ab OR Telephone-delivered:ti,ab)  
AND  
( 'Primary Health Care'/exp/mj OR 'General Practice'/exp/mj OR 'Outpatient'/exp/mj OR 'Speech Therapy'/exp/mj OR Outpatient:ti,ab OR "Primary health":ti,ab OR "Primary care":ti,ab OR "General practice":ti,ab OR "General practices":ti,ab OR "General practitioners":ti,ab OR "General practitioner":ti,ab OR "Family practice":ti,ab OR Physician:ti,ab OR Physicians:ti,ab OR Clinician:ti,ab OR Clinicians:ti,ab OR Therapist:ti,ab OR Nurse:ti,ab OR Nurses:ti,ab OR Physiotherapist:ti,ab OR Rehabilitation:ti,ab OR Diabetes:ti,ab OR Diabetic:ti,ab OR Asthma:ti,ab OR Depression:ti,ab OR "Irritable bowel":ti,ab OR IBS:ti,ab OR PTSD:ti,ab OR "Chronic fatigue":ti,ab)  
AND  
(("Face to face":ti,ab) OR "Usual care":ti,ab OR Visits:ti,ab OR Visit:ti,ab OR In-person:ti,ab OR "In person":ti,ab OR ((Clinic:ti,ab OR Centre:ti,ab OR Home:ti,ab) AND (Based:ti,ab OR Contact:ti,ab)) OR Conventional:ti,ab OR Practice-based:ti,ab OR "Practice based":ti,ab OR Traditional:ti,ab OR "Standard care":ti,ab OR Homecare:ti,ab OR ((Routine:ti,ab OR Home:ti,ab) AND (Care:ti,ab)))  
AND  
('health care delivery'/exp/mj OR Delivery:ti,ab OR Delivered:ti,ab OR Via:ti,ab OR Received:ti,ab)  
AND  
('Cost-Benefit Analysis'/exp/mj OR 'Cost effectiveness':ti,ab OR 'Cost benefit':ti,ab OR 'Cost Analysis':ti,ab OR 'Cost analyses':ti,ab OR 'Productivity gains':ti,ab OR 'Productivity gain':ti,ab OR 'Potential savings':ti,ab OR Cost:ti OR Costs:ti)  
AND  
([cochrane review]/lim OR [systematic review]/lim OR [meta analysis]/lim OR ((Search:ti,ab OR Searched:ti,ab) AND (PubMed:ti,ab OR MEDLINE:ti,ab)) OR (Systematic:ti,ab AND Review:ti,ab) OR 'Meta analysis':ti,ab OR Meta-analysis:ti,ab OR Review:ti OR ((Systematically:ti,ab OR Reviewed:ti,ab) AND (literature:ti,ab)))

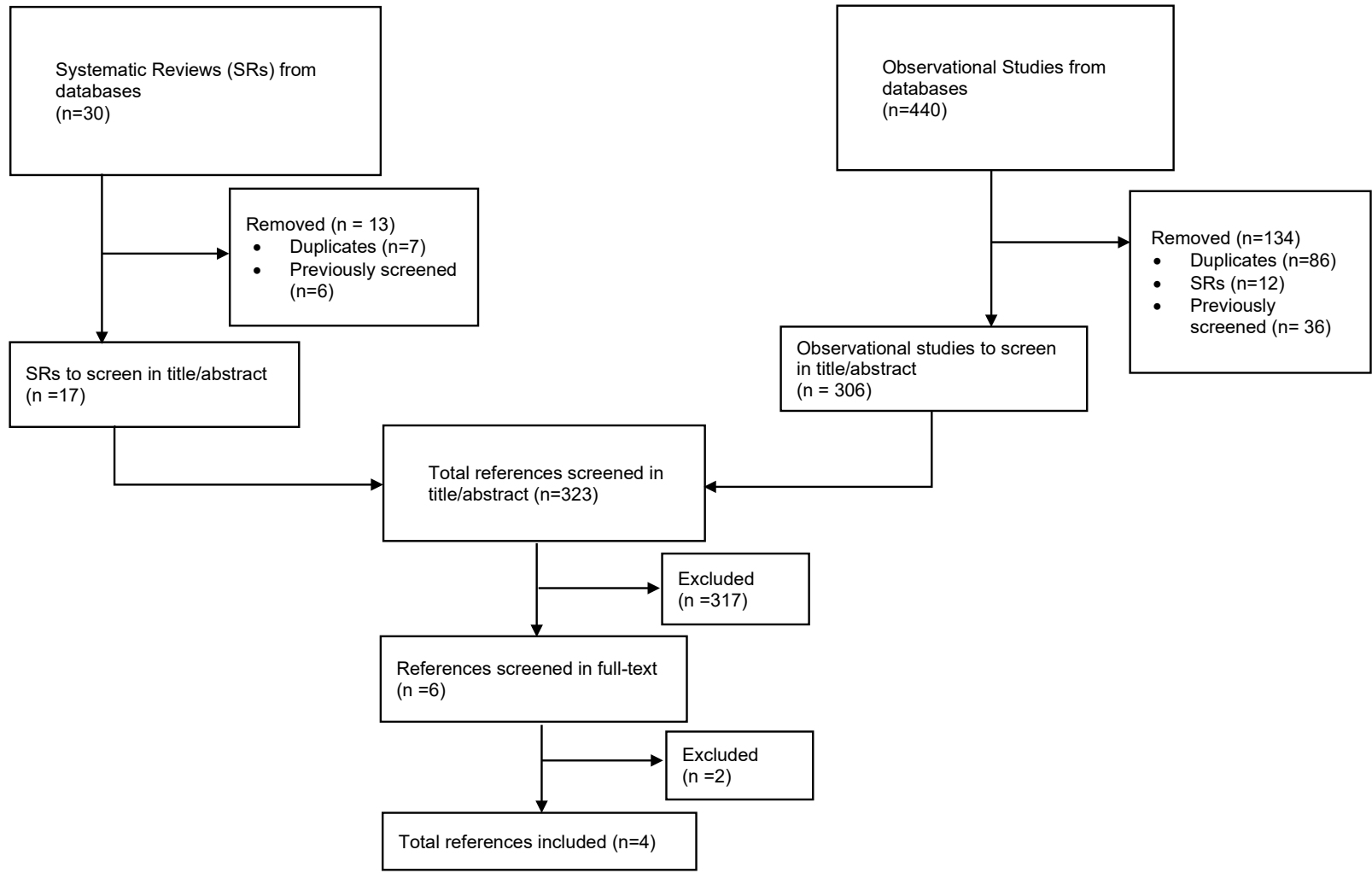
## Appendix 5 – PRISMA flow charts (search results and screening process)

**Question B1. Specialist services:** To identify the evidence comparing telehealth (by video or phone) to face-to-face provision of care in specialist areas, e.g. psychiatric services, cardiac, genetics, etc.



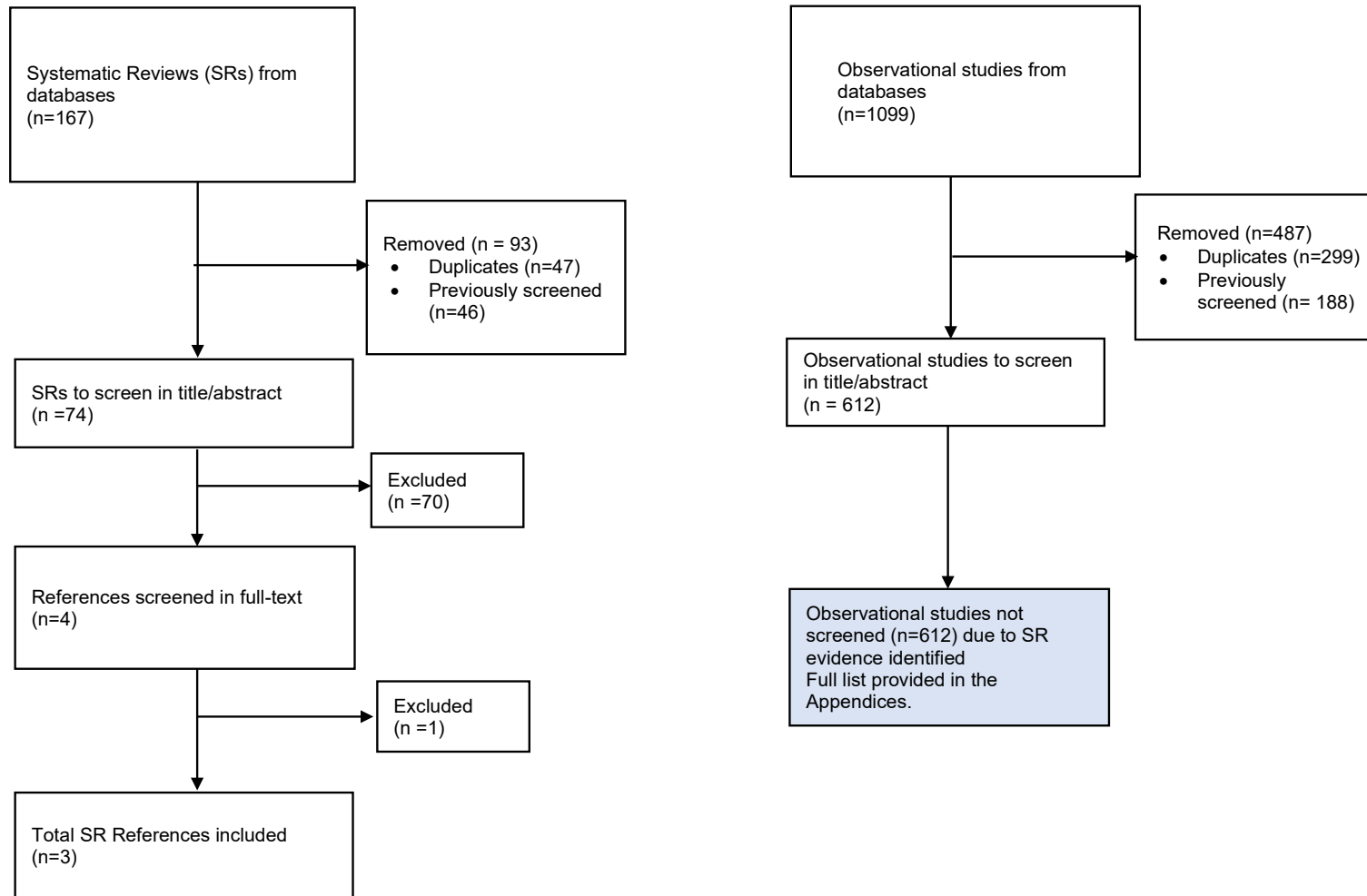
**Question B2. Selected outcomes of interest:** To identify the evidence for critical questions, which may lack randomised controlled trial evidence: referrals to imaging/pathology.

Telehealth Review 2023: Question B2: Selected outcomes of interest: referrals to imaging/pathology



**Question B2. Selected outcomes of interest:** To identify the evidence for critical questions, which may lack randomised controlled trial evidence: economic impacts of telehealth.

Telehealth Review 2023: Question B2: Selected outcomes of interest: economic impacts



## Appendix 6 – List of randomised controlled trials identified for Question B1: Specialist services

| No. | Reference                                                                                                                                                                                                                                                                                                                                                          |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Abbitt D, Choy K, Castle R, Carmichael H, Jones TS, Wikiel KJ, et al. Telehealth follow-up after cholecystectomy is safe in veterans. <i>Surg Endosc.</i> 2022;1-7.                                                                                                                                                                                                |
| 2   | Abstracts from the Quality of Care and Outcomes Research in Cardiovascular Disease and Stroke 2012 Scientific Sessions, QCOR 2012. <i>Circulation: Cardiovascular Quality and Outcomes.</i> 2012;5(3).                                                                                                                                                             |
| 3   | Acosta-Lobos A, Riley JP, Cowie MR. Current and future technologies for remote monitoring in cardiology and evidence from trial data. <i>Future Cardiol.</i> 2012;8(3):425-37.                                                                                                                                                                                     |
| 4   | Actrn. A study to treat cancer related weight loss in patients with mesothelioma. <a href="https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12619001324101">https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12619001324101</a> . 2019.                                                                                                                    |
| 5   | Actrn. Evaluation of feasibility and effectiveness of the Mindgardens Functional Neurological Symptom Disorders (FND) Tic program for children and adolescents. <a href="https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12622001292763">https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12622001292763</a> . 2022.                                      |
| 6   | Actrn. Exploring potential benefit of earlier nutritional interventions in adults with upper gastrointestinal cancer: a randomised trial. <a href="http://www.whooint/trialssearch/Trial2.aspx?TrialID=ACTRN12611000005954">http://www.whooint/trialssearch/Trial2.aspx?TrialID=ACTRN12611000005954</a> . 2011.                                                    |
| 7   | Actrn. My Hip Journey : a virtual program for patients undergoing a total hip replacement. <a href="http://www.whooint/trialssearch/Trial2.aspx?TrialID=ACTRN12617001433392">http://www.whooint/trialssearch/Trial2.aspx?TrialID=ACTRN12617001433392</a> . 2017.                                                                                                   |
| 8   | Actrn. Preoperative exclusive enteral nutrition versus usual care in Crohn's disease. <a href="https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12621000002886">https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12621000002886</a> . 2021.                                                                                                                |
| 9   | Actrn. Randomised controlled trial of a telephone-delivered weight loss intervention for overweight and obese women following treatment for breast cancer (Living Well after Breast Cancer). <a href="https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12612000997853">https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12612000997853</a> .               |
| 10  | Actrn. Structured triage and referral to reduce callers' distress levels when using the Cancer Councils' 13 11 20 telephone services. <a href="https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12617000352303">https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12617000352303</a> . 2017.                                                                |
| 11  | Actrn. Ten year follow-up of a prospective randomized controlled comparison of best practice medical management versus placement of the Lap-Band System to effect weight loss (ACTRN12605000113651). <a href="https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12611000279921">https://trialssearchwhooint/Trial2.aspx?TrialID=ACTRN12611000279921</a> . 2011. |
| 12  | Adly AS, Adly MS, Adly AS. Telemanagement of home-isolated COVID-19 patients using oxygen therapy with noninvasive positive pressure ventilation and physical therapy techniques: Randomized clinical trial. <i>Journal of Medical Internet Research.</i> 2021;23(4).                                                                                              |
| 13  | Akingbade O, Adediran V, Somoye IE, Alade AS, Chow KM. Perceived feasibility and usefulness of mHealth interventions for psychoeducational support among Nigerian women receiving chemotherapy for breast cancer: a focus group study. <i>Support Care Cancer.</i> 2022;30(12):9723-34.                                                                            |
| 14  | Alam W, Bouferaa Y, Haibe Y, Mukherji D, Shamseddine A. Management of colorectal cancer in the era of COVID-19: Challenges and suggestions. <i>Sci Prog.</i> 2021;104(2):368504211010626.                                                                                                                                                                          |
| 15  | Alexander R, Burns DK, Welsh-Bohmer KA, Chiang C, Culp M, O'Neil J, et al. Tomorrow: A trial to delay the onset of MCI due to ad and qualify a genetic biomarker algorithm: Topline results. <i>Journal of Prevention of Alzheimer's Disease.</i> 2018;5(1):S37-S8.                                                                                                |
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| 20  | Armstrong KA, Coyte PC, Brown M, Beber B, Semple JL. Effect of home monitoring via mobile app on the number of in-person visits following ambulatory surgery a randomized clinical trial. <i>JAMA Surgery.</i> 2017;152(7):622-7.                                                                                                                                  |
| 21  | AUGS / IUGA Scientific Meeting 2022. Female Pelvic Medicine and Reconstructive Surgery. 2022;28(6).                                                                                                                                                                                                                                                                |
| 22  | AUGS/IUGA Scientific Meeting 2022. <i>International Urogynecology Journal.</i> 2022;33.                                                                                                                                                                                                                                                                            |
| 23  | Avutu V, Monga V, Mittal N, Saha A, Andolina JR, Bell DE, et al. Use of Communication Technology to Improve Clinical Trial Participation in Adolescents and Young Adults With Cancer: Consensus Statement From the Children's Oncology Group Adolescent and Young Adult Responsible Investigator Network. <i>JCO Oncol Pract.</i> 2022;18(3):224-31.               |
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| 26  | Babar M, Zhu D, Loloi J, Laudano M, Ohmann EL, Abraham N, et al. Telemedicine for Adult Nephrolithiasis Postoperative Care: Sub-Analysis of the Randomized Evaluation and Metrics Observing Telemedicine Efficacy (REMOTE) Trial. <i>Journal of Endourology.</i> 2022;36:A167.                                                                                     |
| 27  | Ball C, Puffett A. The assessment of cognitive function in the elderly using videoconferencing. <i>J Telemed Telecare.</i> 1998;4 Suppl 1:36-8.                                                                                                                                                                                                                    |
| 28  | Baque E, Barber L, Sakzewski L, Boyd RN. Randomized controlled trial of web-based multimodal therapy for children with acquired brain injury to improve gross motor capacity and performance. <i>Clinical rehabilitation.</i> 2017;31(6):722-32.                                                                                                                   |

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## Appendix 7 – List of observational studies identified for Question B2: Selected outcomes of interest: Economic impacts

| No. | Reference                                                                                                                                                                                                                                                                                                                                                              |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Long-term oxygen therapy for patients with chronic obstructive pulmonary disease (COPD): an evidence-based analysis. <i>Ont Health Technol Assess Ser.</i> 2012;12(7):1-64.                                                                                                                                                                                            |
| 2   | Telemedicine approaches to evaluating acute-phase retinopathy of prematurity: study design. <i>Ophthalmic Epidemiol.</i> 2014;21(4):256-67.                                                                                                                                                                                                                            |
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The present review was commissioned by the Department of Health and Aged Care, Canberra, Australia. The present review is an update and extension to a previously commissioned review by the then-Department of Health, in 2020-21. Five authors of the present review (AMS, MB, HG, JC, PG) were also involved in the conduct of the previous review. The Department was involved in establishing the parameters of the study question (PICO). The Department was not involved in the conduct, analysis, or interpretation of the evidence syntheses' findings. The authors report no other actual or potential conflicts of interest.

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[N.B. References for the individual evidence syntheses/summaries are provided at the end of each individual section]

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