The Strategy Unit.

COVID-19 and Coronavirus evidence alerting

Rapid scan 2:Rehabilitation needs and post-ICU recovery for severe Covid19 patients

13 May 2020

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NHS
Midlands and Lancashire
Commissioning Support Unit

The Strategy Unit is working in collaboration with the Health Foundation, King's Fund, Nuffield Trust, and Imperial College Healthcare Partners to provide additional analytical support to the NHS nationally in its overall response to COVID-19. The organisations will use their expertise to focus on questions that the NHS may lack the immediate resources to look at, which may be more medium-term, cut across sectors, or benefit from independent analysis. They will be sharing their knowledge, information, multi-disciplinary analytical skills, and extensive links to support different parts of the health and care system, arms-length bodies and government departments working on the COVID-19 response. For more information please email mlcsu.covid.analytics@nhs.net.

This rapid summary is part of an evidence alert service which has developed from requests for evidence to support recovery planning. Our first priority is to highlight key papers to inform decisions, policy and planning and our approach is pragmatic rather than exhaustive. More information on our methodology is provided in the Appendix.

A short note about evidence analysis and COVID-19

The emerging evidence base on COVID-19 and Coronavirus is growing quickly. The research community has responded to the pandemic quickly and publishers are fast-tracking papers and providing open access. This inevitably leads to some trade-offs:

- Findings are shared quickly but there are implications for quality as the usual peer review is curtailed - so we need to be mindful of bias in research methods and quality of reporting.
- The pace of learning is such that, at the moment, it is not feasible to conduct a traditional review which summarises and synthesises what we know. The evidence base is growing so quickly that our understanding is continually shifting.

Our approach is to trawl the rapidly growing knowledge base, to filter findings which are relevant to planning and policy and to highlight new and emerging learning:

- This rapid scan provides a snapshot of emerging evidence.
- A weekly alert will highlight new papers.
- We will also maintain an evidence tracker, providing a single point of access to the papers highlighted in this scan and in weekly alerts.

There are, of course, initiatives around the UK and internationally to scan and track evidence and we'll endeavour to avoid duplication as far as possible.

Introduction

Data suggests that rehabilitation at all stages- in hospital and in the community is critical during the Covid-19 pandemic. It will keep the flow of patients moving, enable the continuum of care and will improve the health outcomes of patients with Covid-19.

This rapid summary has been created to collate new and emerging evidence on rehabilitation needs and post-ICU recovery for severe Covid-19 patients.

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Summary

Rehabilitation will be needed for some Covid-19 patients who will have physical, psychological and functional needs and will require some form of ongoing care. Data shows this support will improve long term outcomes and free up acute hospital capacity.

There is a plethora of transferable evidence related to rehabilitation needs from previous pandemic and incidents. There seems, however, little relating to the rehabilitation needs for Covid-19 patients specifically. There are number of recurring themes relating to rehabilitation:

Support across the pathway-Given the diversity of presentation and rehabilitation needs, evidence shows different patients require different types of services- both physical and psychological, across ICU, hospital wards, step down facilities and the community.

Risks for prolonged inpatient stay- Cognitive impairment, paralysis, and those requiring a ventilator or dialysis are among the factors associated with a greater risk of prolonged in-patient rehabilitation stay.

Multidisciplinary teams- Studies state rehabilitation is best delivered by specialists in multidisciplinary teams to consider the psychological, functional and physical aspect of patients' recovery. It provides effective co-ordination of care and avoidance of duplication of services.

Personalised care - Studies have shown patient will require different services at different stages in their recovery. A personalised service based on individual needs is proven to be useful and good communication with patients and family members regarding next steps and treatments are suggested.

Centres of excellence- Provision of rehabilitation support facilities referred to as "Centres of Excellence", for those who survive but need care and cannot return to their own homes have been recommended. The repurposing of unused buildings could rapidly expand the supply of space.

Mental and physical support- A range of fatigue, depression and mental health problems are reported to affect Covid-19 patients. A combination of physical interventions such as physiotherapy, respiratory and graded exercise programmes and psychological intervention are suggested.

Technology- Studies have shown the widespread application of remote rehabilitation and tele-rehabilitation to reduce the need for in-person care including live consultations, or pre-recorded sessions for generic material. However, virtual care is reported to have many limitations which should be reviewed before implementation.

Commentary

08/04/20	HSJ	UK	We need a Nightingale model for rehab after covid-19[1]
11/04/20	Science Media Centre	UK	Expert comment on treatment and recovery post-COVID infection[2]
14/04/20	J Rehabil Med	Europe	COVID-19 AND POST INTENSIVE CARE SYNDROME: A CALL FOR ACTION[3]
14/04/20	J Rehabil Med	Italy	REHABILITATION OF COVID-19 PATIENTS[4]
25/03/20	JAMA	US	Postacute Care Preparedness for COVID-19 Thinking Ahead[5]
08/04/20	Heart and Lung	China	Early pulmonary rehabilitation for SARS-CoV-2 pneumonia: Experience from an intensive care unit outside of the Hubei province in China[6]

Guidance

British Society of Rehabilitation Medicine (BSRM)	Rehabilitation in the wake of Covid-19 - A phoenix from the ashes[7]
The British Psychological Society	Meeting the psychological needs of people recovering from severe coronavirus (Covid-19)[8]
Chartered Society of Physiotherapy	Rehabilitation during and after the Covid-19 pandemic[9]
European Respiratory Society	REPORT OF AN AD-HOC INTERNATIONAL TASK FORCE TO DEVELOP AN EXPERT-BASED OPINION ON EARLY AND SHORT-TERM REHABILITATIVE INTERVENTIONS (AFTER THE ACUTE HOSPITAL SETTING) IN COVID-19 SURVIVORS[10]
Pan American Health Organization	Rehabilitation considerations during the COVID-19 outbreak[11]

Rapid reviews

Systematic rapid "living" review on rehabilitation needs due to covid-19: update to march 31st 2020[12]

Ceravolo MG, De Sire A, Andrenelli E, Negrini F, Negrini S (2020) Eur J Phys Rehabil Med.

This rapid review presents updates on the latest scientific research (up to March 31st 2020) on rehabilitation needs due to Covid-19. Nine articles were included in the review, all of which were based on previous literature and not on the current Covid-19 pandemic. Four of which calls for action, three provide recommendations about rehabilitation interventions in the acute phase and two address the needs of people quarantined at home or with restricted mobility due to lockdown and one provides a core outcome set to be used in clinical trials to test the efficacy of health strategies in managing Covid-19 patients. The main messages include:

- Early rehabilitation should be granted to inpatients with Covid-19;
- People with restricted mobility due to quarantine or lockdown should receive exercise programs to reduce the risk of frailty, sarcopenia, cognitive decline and depression
- Telerehabilitation may represent the first option for people at home.
- Job activities should be re-organised both in inpatient and outpatient facilities to ensure patient and staff safety and to limit the spread.

Rehabilitation management of patients with COVID-19. Lessons learned from the first experiences in China[13]

Li J. (2020) Eur J Phys Rehabil Med.10.

This paper provides a series of lessons learnt from the rehabilitation management of patients with Covid-19 in China. These are presented below:

- Rehabilitation emphasises treatment with appropriate methods at the right time and must be based on the premise of patients stability
- Like clinical disciplines, rehabilitation should be guided with a rigorous attitude and evidence based. Exploratory studies are not equal to scientific conclusion. Any scientific research requires rigorous design, research, data collection and analysis, before drawing conclusions
- Focus of rehabilitation COVID-19 has greatly promoted the widespread application of remote rehabilitation medicine. It is hoped that work in this direction will lead to a new era of smart rehabilitation
- Breakthroughs in smart rehabilitation equipment includes various robots, wearable equipment, large data transmission (5G technology) and artificial intelligence (AI) analysis are of great value for disease prevention and control, medical care and rehabilitation

Rapid reviews

Rehabilitation following critical illness in people with COVID-19 infection[14]
Simpson R and Robinson L. (2020) *Am J Phys Med Rehabil*.
This paper explores the role of rehabilitation providers in helping move patients from acute sites to the community. It presents the following evidence based recommendations:

1) Rehabilitation is best delivered by specialists in multidisciplinary teams (MDT) with a broad range of skills to support bio-psycho-social functioning. Maintaining active, reciprocal lines of communication between a finite number of care providers will be important for effective co-ordination of care, avoidance of redundancy/unnecessary duplication of services.
2) Rehabilitation in the ICU may involve screening for delirium and use of general prevention strategies, medication review, planned regular sedation breaks, multimodal attempts at orientation, passive and active mobilization, and, where possible, begin to build an empathic, compassionate therapeutic alliance with the patient and family. Likewise, step down from an ICU environment to ward level care will likely come with mixed feelings for patients and families. It is therefore important to provide simple, honest, accurate, factual information regarding treatments and next steps
3) A commonly described barrier to active mobilisation in the ICU is fear that this may interfere with critical life support devices, However, various studies have confirmed that active mobilization is feasible and safe in these circumstances and recommend the 'traffic light' system.
4) Baseline measures of function taken in the ICU can be compared with current status and the patient may at this stage have a greater capacity for involvement with goal planning and engagement with therapy session.
5) Virtual care allows personalized consultation and treatment via telephone or live internet connections, or via pre-recorded sessions for more generic materials. However, virtual care also has many limitations This may not be possible for many patients. Rehabilitation providers should start to consider the scope and limitations of virtual physical examinations and make patients expressly aware of this accordingly.
6) Rehabilitation specialists could have an important public health role to play in educating patients and families through provision of evidence based, personalized recommendations for home-based physical activity, nutrition, managing stress and stopping smoking.

Emerging Covid-19 evidence *(not peer-reviewed)*

Features of 16,749 hospitalised UK patients with COVID-19 using the ISARIC WHO Clinical Characterisation Protocol[15]
Docherty AB et al. (2020) medRxiv preprint doi: https://doi.org/10.1101/2020.04.23.20076042
This paper aims to characterize the clinical features of patients with severe COVID-19 in the UK. It utilises a prospective observational cohort study with rapid data gathering and near time analysis, using pre approved questionnaire adopted by WHO. Results presented below demonstrates the importance of pandemic preparedness and the need to maintain readiness to launch research studies in response to outbreaks. Results revealed:

- The median age of patients with Covid-19 was 72 years, the median duration of symptoms before admission was 4 days and the median duration of hospital stay was 7 days.
- The commonest comorbidities were chronic cardiac disease (29%), uncomplicated diabetes (19%), non-asthmatic chronic pulmonary disease (19%) and asthma (14%); 47% had no documented reported comorbidity.
- Increased age and comorbidities including obesity were associated with a higher probability of mortality. Distinct clusters of symptoms were found including: respiratory (cough, sputum, sore throat, runny nose, ear pain, wheeze, and chest pain), systemic (myalgia, joint pain and fatigue) and enteric (abdominal pain, vomiting and diarrhoea).
- Overall, 49% of patients were discharged alive, 33% have died and 17% continued to receive care at date of reporting. 17% required admission to High Dependency or Intensive Care Units; of these, 31% were discharged alive, 45% died and 24% continued to receive care at the reporting date. Of those receiving mechanical ventilation, 20% were discharged alive, 53% died and 27% remained in hospital.

Post-Discharge Cardiac Care in the Era of Coronavirus 2019: How Should We Prepare?[16]
Percy E et al. (2020) *Can J Cardiol*. S0828-282X(20)30388-3.
This paper describes the current status of post-discharge cardiac care in Canada and provides steps that policymakers and healthcare organisations can take to prepare for COVID-19 pandemic.

- Open communication between cardiac rehabilitation centres will be needed for knowledge exchange, allowing centres not currently offering home-based programs to quickly learn from other centres where this practice has been successfully implemented.
- There is a need to maximize mobile health technology to minimize patient and healthcare personnel exposure to COVID-19. In the context of this pandemic, telehealth technology can be leveraged to reduce the need for in-person care, for appropriate patients.
- Patient-level factors should also be taken into consideration for the prioritization of inpatient space. In particular, cognitive impairment, paralysis, and those requiring a ventilator or dialysis are among the factors associated with a greater risk of prolonged in-patient rehabilitation stay.
- The repurposing of unused buildings such as hotels, convention halls, clinics, and other spaces to establish temporary post-acute care settings, where appropriate, could rapidly expand the supply of space, particularly in areas which are currently underserved by post-acute care facilities

Emerging Covid-19 evidence *(not peer-reviewed)*

Considerations for Postacute Rehabilitation for Survivors of COVID-19[17]
Sheehy LM JMIR Public Health Surveill 2020;6(2):e19462 DOI: 10.2196/19462

The objective of this report is to answer the question "What rehabilitation services do survivors of COVID-19 require?" The question is asked within the context of a subacute hospital delivering geriatric inpatient and outpatient rehabilitation services. Three areas relevant to rehabilitation after Covid-19 were identified:

Patient Presentation For COVID-19 Survivors in the Rehabilitation Unit:

- Survivors requiring prolonged rehabilitation are more likely to be older and to have pre-existing cardiovascular and cerebrovascular disease, which may influence their rehabilitation and outcomes.
- Research studies on the effects of post acute care rehabilitation are inconclusive but suggest that comprehensive integrated inpatient rehabilitation is required
- Patients who are discharged to rehabilitation facilities or long-term care may still be able to transmit disease, potentially infecting other patients or residents.

Suggested Procedures for Post–COVID-19 Rehabilitation:

- A separate unit or area is suggested for the rehabilitation of patients post–COVID-19 and other patients arriving on
- the unit.
- Rehabilitation at home, may be a good option as isolation is easier at home- level of care must be on par with inpatient rehabilitation.
- Home-based therapy can be provided over the internet and telephone via telerehabilitation

Rehabilitation Guidelines After COVID-19:

- Recommendations from both China and Italy state that to avoid aggravating respiratory distress or dispersing the virus unnecessarily, respiratory rehabilitation should not begin too early
- Psychological interventions delivered by occupational therapists, social workers or rehabilitation psychologists may be required for patients with depression, anxiety, or PTSD
- A RDC showed significant improvement in respiratory function, endurance, quality of life, and depression from 2 sessions of 10 minutes of respiratory rehabilitation per week for 6 weeks, following discharge from acute care

Emerging Covid-19 evidence *(not peer-reviewed)*

Covid-19: the challenge of patient rehabilitation after intensive care[18]
Thornton, J (2020) BMJ 2020;369:m1787
This article examines the "*tsunami of rehabilitation needs*" as Covid-19 patients begin to leave ICU before presenting some case studies. Key findings include:

- ICU patients may be the sickest people in the country, but once they leave they may be getting the least support.
- Evidence from China shows that Covid-19 patients have neurological as well as respiratory after effects, so recovery will be longer and more complex.
- The UK government predicts that 45% of patients will need some form of low level medical or social input for recovery and that 4% will require more focused, ongoing intense rehabilitation in a bedded setting.
- GPs need to be aware of the huge impact of ICU and rehabilitation needs. "*This is an area that's completely outside GPs' experience*".
- Discharge documentation letters need to be very explicit and clear, "*to communicate that we expect there will be longstanding physical, psychological, and cognitive problems that the patient will need support and attention for.*"
- Rehabilitation must be given to justify the original treatment. *"Why invest so much ICU time and resource to save a life, to then leave a patient with debilitating symptoms and a family floundering with no idea what to do to make anything better?"(*Physiotherapy Lead).
- Early indications suggest that Covid-19 patients will need even more psychological support than typical ICU patients because of higher levels of "*survivors' guilt*" and post-traumatic stress disorder.
- **Case study—Royal Berkshire Hospital .** This hospital offers 'intensive aftercare' for around 300 patients every year. They are first seen at an outpatient clinic two months after discharge and then again at six months and a year. At each stage they are assessed and may be further referred for physiotherapy, psychological help, memory help, ENT treatment, or post-traumatic stress counselling.
- **Case study—Morriston Hospital, Swansea.** Every patient in ICU for three days or more is referred to a follow-up clinic comprising a consultant and physiotherapist, who act as a triage to further services. The hospital also offers a six week, twice weekly, one-to-one rehabilitation programme.

Lessons from previous pandemics and major incidents

Long-term sequelae of SARS: physical, neuropsychiatric, and quality-of-life assessment[19]

Hui DS et al. (2009). *Hong Kong Med J*.15 Suppl 8, 21-23.

This paper aims to examine the impacts of SARS on pulmonary functions, exercise capacity and HRQoL [Health Related Quality of Life] among survivors from a longitudinal study of patients who survived the outbreak in 2003. The main findings include:

- Impairment of lung diffusing capacity persisted in 24% of SARS survivors; their exercise capacity and health status were markedly lower than the general population at 1 year after illness onset.
- There was no difference in lung function indices, exercise capacity, and health status at 1 year between the intubated and non-intubated SARS patients admitted to the intensive care unit, although the former had more severe lung injury.
- The functional disability in SARS survivors appears out of proportion to the degree of lung function impairment and may be due to additional factors such as muscle deconditioning, steroid-related musculoskeletal complications, critical illness-related neuropathy/myopathy, and/or psychological factors.

SARS: prognosis, outcome and sequelae[20]

Chan KS et al. (2003) *Respirology*. 8, S36-S40

This paper explored the prognosis, outcomes and sequelae of SARS which could provide transferable lessons for COVID 19.

- Several adverse prognostic factors have been identified, including advanced age, presence of comorbidity, higher lactose dehydrogenase levels and initial neutrophil count, but the impact of viral and other host factors on outcome is unknown.
- Severe acute respiratory syndrome (SARS) is associated with considerable morbidity and mortality in the acute phase. Worldwide case fatality rate is 11% (range 7 to 27%) for the most severely affected regions.
- Published data on sequelae of SARS are limited. Clinical follow-up of patients who recovered from SARS has demonstrated radiological, functional and psychological abnormalities of varying degrees. In the early rehabilitation phase, many complained of limitations in physical function from general weakness and/or shortness of breath. In a small series of subjects who underwent CT scan of the chest, over half showed some patchy changes consistent with pulmonary fibrosis.
- Psych behavioural problems of anxiety and/or depression were not uncommon in the early recovery phase, and improved over time in the majority of patients.
- The long-term sequelae of SARS are still largely unknown. It is important to follow up these patients to detect and appropriately manage any persistent or emerging long-term sequelae in the physical, psychological and social domains

Lessons from previous pandemics and major incidents

Recovery pathway of post-SARS patients[21]

Chan JC (2005) *Thorax*. 60(5), 361-362.

This editorial provides useful evidence about the recovery pathway of post-SARS patients including recovery of lung functions, recovery of functional capacity and quality of life.

Recovery of lung function

- Pulmonary function returns to normal or is nearly normal by 6 months to 1 year, with the exception of a persistent reduction in carbon monoxide diffusion capacity.
- Hui et al reported that 15.5% of their patients had impaired TLCO and a 7.3% reduction in lung volumes at 6 months. In the same study about a quarter of the patients were found to have respiratory muscle weakness at 3 months, suggesting extrapulmonary pathology for the reduction in lung volumes.

Recovery of functional capacity and quality of life

- In the cohort of SARS survivors studied by Hui et al the mean 6 minute walk distance, although improved from 3 to 6 months, remained lower than the normal range across all ages at 6 months. The measured SF36 scores were also lower than normal at 6 months. Although SARS patients might not have suffered from critical illness-associated polyneuromyopathy, other factors such as corticosteroid-induced myopathy, prolonged confinement and/or immobilisation and SARS-induced myositis, as postulated by Hui et al, are likely contributors to post-SARS generalised muscle weakness.

Psychological recovery

- Patients with SARS during the 2003 outbreak no doubt went through a highly stressful experience, including their close encounter with a then mysterious infectious disease which, in a minority of patients, could be fatal, and the physical and social isolation mandated by the authority.

Mental morbidities and chronic fatigue in severe acute respiratory syndrome survivors: long-term follow-up[22]

Lam MH et al. (2009) *Arch Intern Med*. 169(22),2142-2147.

This paper explored the long term psychiatric morbidities and chronic fatigue among SARS survivors in Hong Kong. They were assessed by a constellation of psychometric questionnaires and a semi-structured clinical interview for the Diagnostic and Statistical Manual of Mental Disorders. Results revealed:

- Over 40% of the respondents had active psychiatric illnesses, 40.3% reported a chronic fatigue problem, and 27.1% met the modified 1994 Centers for Disease Control and Prevention criteria for chronic fatigue syndrome.
- Logistic regression analysis suggested that being a health care worker at the time of SARS infection, being unemployed at follow-up, having a perception of social stigmatization and having applied to the SARS survivors' fund were associated with an increased risk of psychiatric morbidities at follow-up, whereas application to the SARS survivors' fund was associated with increased risk of chronic fatigue problems.

Lessons from previous pandemics and major incidents

Stress and psychological distress among SARS survivors 1 year after the outbreak[23]

Lee AM et al. (2007) *Can J Psychiatry*. 52(4), 233-240.

This study examined the stress level and psychological distress of severe acute respiratory syndrome (SARS) survivors 1 year after the outbreak. During the SARS outbreak in 2003, the 10-item Perceived Stress Scale (PSS-10) was used to assess SARS survivors treated in 2 major hospitals. Results revealed

- SARS survivors had higher stress levels during the outbreak, compared with control subjects (PSS-10 scores = 19.8 and 17.9, respectively; $P < 0.01$), and this persisted 1 year later (PSS-10 scores = 19.9 and 17.3, respectively; $P < 0.01$) without signs of decrease.
- In 2004, SARS survivors also showed worrying levels of depression, anxiety, and posttraumatic symptoms. An alarming proportion (64%) scored above the GHQ-12 cut-off that suggests psychiatric morbidity.
- During the outbreak, health care worker SARS survivors had stress levels similar to those of non-health care workers, but health care workers showed significantly higher stress levels in 2004 (PSS-10 score = 22.8, compared with PSS-10 score = 18.4; $P < 0.05$) and had higher depression, anxiety, posttraumatic symptoms, and GHQ-12 scores.

Posttraumatic stress after SARS[24]

Wu KK et al. (2005) *Emerg Infect Dis*. 11(8):1297-1300.

This study looked at 2 Chinese self-report measures to examine features of PTSD, anxiety, and depression in 131 survivors of severe acute respiratory syndrome at 1 month and 3 months after discharge from the hospital. Risk factors associated with psychological distress were identified. The key findings included:

- The occurrence rate of PTSD features for SARS survivors is in the middle of the range, reported in previous samples of other medical diseases. For most SARS survivors, a significant decrease in symptom severity from l month to 3 months after discharge was identified.
- The significant predictive value of SaO2 as an index of disease severity in this study suggests that direct physiologic measures may be more sensitive as indexes of disease severity than other indexes, which could be confounded by other factors (e.g. treatment regimen)
- Findings imply that mobilization of resources for emotional support may enhance resilience of SARS survivors. SARS survivors who were healthcare workers, knew someone who had SARS, or had a history of psychiatric consultation had a higher risk for psychological distress and may warrant early and focused support services.

Lessons from previous pandemics and major incidents

Adjustment outcomes in Chinese patients following one-month recovery from severe acute respiratory syndrome in Hong Kong[25]

Cheng SK et al. (2004) *J Nerv Ment Dis*. 192(12), 868-871.

This study aimed to examine the short-term adjustment outcomes including distress, self-esteem, and quality of life among Chinese patients after 1-month recovery from severe acute respiratory syndrome (SARS) in Hong Kong and to investigate the predictive abilities of a set of selected variables on the outcomes. 100 SARS survivors (mean age = 37; 66 women) and 184 community subjects completed self-administered questionnaires.

- In the General Health Questionnaire-28, 61% of the SARS survivors were identified as distressed cases under a conservative cut off score of 6. Compared with the community sample, SARS survivors had significantly more distress and poor quality of life.
- Being a healthcare worker, severity of SARS symptoms, steroid dosage, and social support accounted for a portion of variances of different measures.
- Early psychiatric screening and intervention may be beneficial for the adjustment of SARS survivors after short-term recovery.

A randomised controlled trial of the effectiveness of an exercise training program in patients recovering from severe acute respiratory syndrome[26]

Lau HM et al (2005). *Aust J Physiother*. 2005;51(4):213-219.

The aim of this study was to evaluate the effectiveness of an exercise training program on cardiorespiratory and musculoskeletal performance and health-related quality of life of patients who were recovering from severe acute respiratory syndrome (SARS) using a randomised controlled trial. A 6-week supervised exercise training program was carried out in the physiotherapy department of a university teaching hospital. One hundred and thirty-three patients referred from a SARS Review Clinic solely for physiotherapy were included. Cardiorespiratory fitness, musculoskeletal performance and health-related quality of life (SF-36) were measured and evaluated.

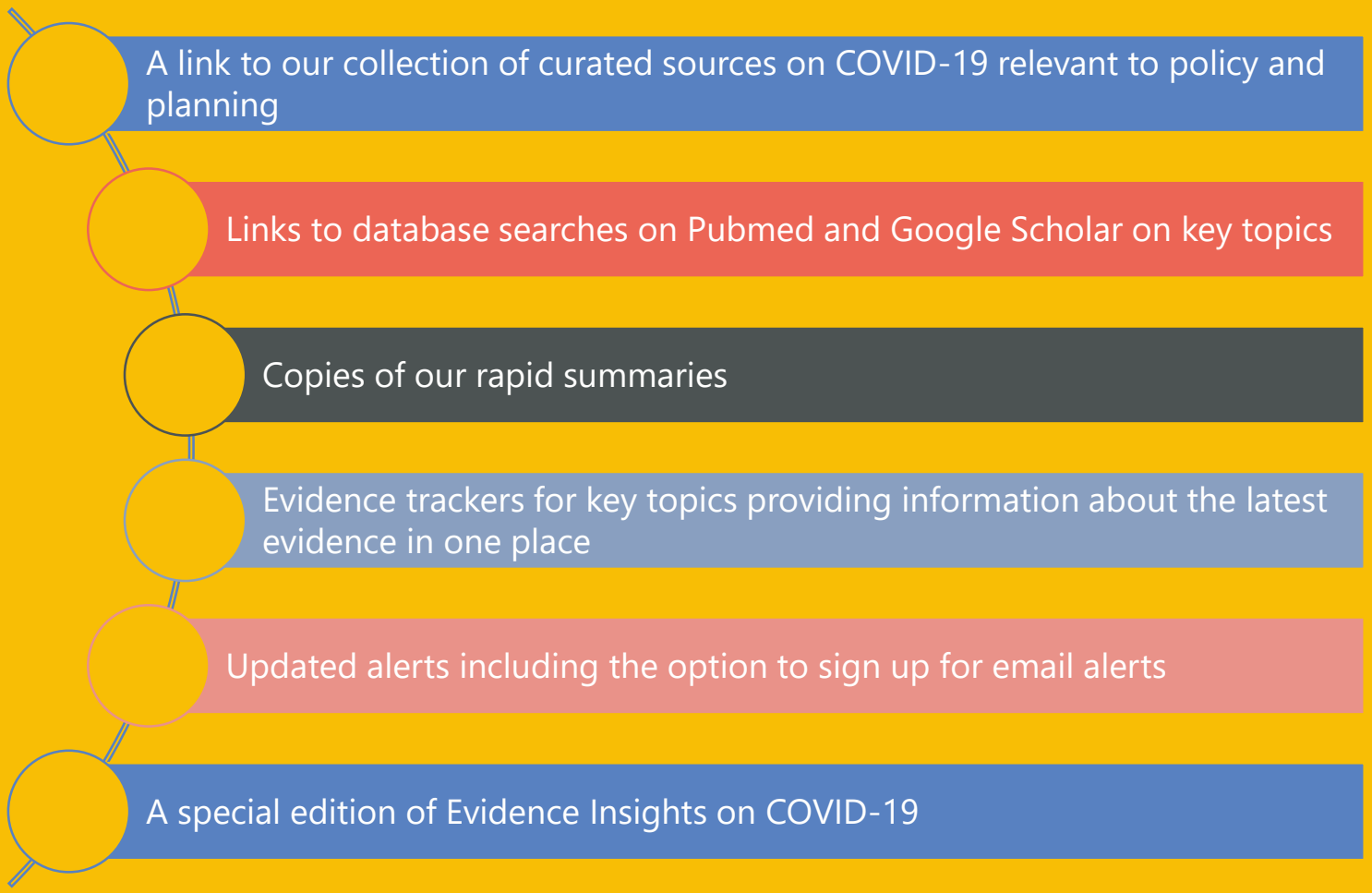
- After 6 weeks, significantly greater improvement was shown in the exercise group in the 6-minute walk test (77.4 m vs 20.7 m, $p < 0.001$), VO(2max) (3.6 ml/kg/min vs 1 ml/kg/min, $p = 0.04$), and musculoskeletal performance (handgrip strength, curl-up and push-up tests, $p < 0.05$).
- Effects on health-related quality of life were not statistically significant. It was concluded that the exercise training program was effective in improving both the cardiorespiratory and musculoskeletal fitness in patients recovering from SARS. However, health-related quality of life was not affected by physical training.

Ongoing studies

Study title	Study type	Country	Link
A Multi-centre, Multi-country Retrospective Cohort Study to Evaluate the Clinical Outcomes in Adults with Severe COVID-19	Retrospective cohort study	Multi-country	https://www.hra.nhs.uk/covid-19-research/approved-covid-19-research/282652/[27]

Keep up to date

Keep up with new and emerging evidence via our web page, where you will find:
https://www.strategyunitwm.nhs.uk/COVID-19-and-coronavirus



Links

1. https://www.hsj.co.uk/commissioning/we-need-a-nightingale-model-for-rehab-after-covid-19-/7027335.article
2. https://www.sciencemediacentre.org/expert-comment-on-treatment-and-recovery-post-covid-infection/
3. https://repub.eur.nl/pub/126304/Repub_126304_O-A.pdf
4. https://www.medicaljournals.se/jrm/content/html/10.2340/16501977-2678
5. https://jamanetwork.com/journals/jama/fullarticle/2763818
6. https://www.heartandlung.org/article/S0147-9563(20)30141-2/pdf
7. https://www.bsrm.org.uk/downloads/covid-19bsrmissue1-published-27-4-2020.pdf
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13. https://www.minervamedica.it/en/journals/europa-medicophysica/article.php?cod=R33Y9999N00A20042403
14. https://journals.lww.com/ajpmr/Abstract/9000/Rehabilitation_following_critical_illness_in.98021.aspx
15. https://www.medrxiv.org/content/10.1101/2020.04.23.20076042v1.full.pdf

Links

16. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7194869/pdf/main.pdf
17. https://publichealth.jmir.org/2020/2/e19462/#Introduction
18. https://www.bmj.com/content/bmj/369/bmj.m1787.full.pdf
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24. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3320475/pdf/04-1083.pdf
25. https://journals.lww.com/jonmd/Abstract/2004/12000/Adjustment_Outcomes_in_Chinese_Patients_Following.11.aspx
26. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7130114/pdf/main.pdf
27. https://www.hra.nhs.uk/covid-19-research/approved-covid-19-research/282652/

Appendix - Methodology

Scoping the review

Geography	International
Settings	All care settings – secondary, primary, community, independent – unless specified
Language/s	No language restrictions but please note there is no budget for translation. Therefore, we will prioritise translated materials where available and will source translations within existing resource.
Dates	We may limit evidence relating to earlier pandemics/major incidents to the last 10 years, should the volume of results be high, to focus on contemporary literature.

Search sources and locations

Bibliographic databases:

- Pubmed
- Google Scholar
- Cochrane Library
- CINAHL
- Global Health
- Disaster Lit

Aggregators and search engines:

- NHS Evidence
- TRIP (using Covid filters)

Grey literature:

via our curated collection of resources on COVID-19 and Coronavirus [28]