education

FROM THE JOURNALS Edited highlights of weekly research reviews

Culture club

This week's Education pages in *The BMJ* include a guide to the uncertainties and complexities of a seemingly simple question: how long do you stay infectious for after covid-19? (Practice pointer, pp 74-77.) Viral culture is seen as a reasonable surrogate for infectiousness but impractical for clinical use. A small study of 66 people with covid-19 during the delta and omicron eras looked at how long it took to convert to culture-negative infection—that is, probably not infectious—after onset of symptoms or a positive PCR test. It found that plenty of people in the study still had positive cultures beyond five days after developing symptoms: the median number of days to culture conversion was six days for delta infection and eight days for omicron.

N Engl J Med doi:10.1056/NEJMc2202092

Attention please

An unblinded randomised trial set in US oncology centres found small improvements in measures of quality of life, physical activity, and symptom control in people with metastatic cancer who completed weekly electronic symptom monitoring compared with usual care. The authors acknowledge that "it is possible that the additional attention received by the intervention group, rather than the intervention components, explained the benefits reported here"; that minimal clinically important differences are not established for the outcomes measured; and that being aware of which group patients were assigned to could contribute to the differences seen. I think whether I found completing a weekly survey of my symptoms helpful would depend a lot on what my "usual care" looked like, in particular how accessible primary and secondary care support is.

JAMA doi:10.1001/jama.2022.9265

Code of conduct

When a new incentive scheme comes along in primary care it usually comes with a new code to remember to add to patients' clinical notes. Codes used to get printed out and stuck to the edge of every computer monitor, but there are now so many that the printout has been replaced by computer templates. Because we forget to (or don't want to) use templates, on-screen popups appear to remind us to use the templates, and the simple and seemingly unintrusive idea to incentivise clinical activity by adding codes to patient notes has become a monster that eats up half of your appointment time and all of your enthusiasm.

In the US, primary care physicians seem to be coding for only a fraction of the prevention and coordination work that they do—and losing out on bucket loads of cash in the process. Researchers used national survey data and claims data to estimate the potential and actual use of codes for billing prevention and coordination work in the notes of Medicare patients. They estimate that a primary care physician could add around $200 000 to their practice's income each year by providing and billing all prevention and coordination work for half of all eligible patients and conclude that "attempting to codify each distinct activity done by a primary care physician . . . may not be an effective strategy for supporting primary care." Too right!

Ann Intern Med doi:10.7326/M21-4770

Ratings wars

Websites rating individual doctors haven't taken off in the UK as they have in the US, where, according to a new study in *JAMA Internal Medicine*, over half of US doctors have been rated on at least one of the four main doctor rating platforms. Clearly these ratings are a serious business, as demonstrated by this study—an automated Google web search of over a million physicians—of how physician ratings vary with time. The main findings are that online ratings are, on average, over five years old, and over 40% of reviews within the last three years are meaningfully different from the individual physician's average rating.

JAMA Intern Med doi:10.1001/jamainternmed.2022.2273

Tenecteplase and thank you

Tenecteplase, a genetically modified variant of alteplase, is quicker to prepare than alteplase and can be given as a bolus—useful properties in the context of treating acute stroke—but is it as safe and effective? A pragmatic, multicentre, open-label randomised trial of patients presenting with acute ischaemic stroke within 4.5 hours of symptom onset has found tenecteplase 0.25 mg/kg to be non-inferior to alteplase 0.9 mg/kg in terms of recovery rates. Excellent functional outcomes were achieved in around a third of patients in both the tenecteplase and alteplase arms of the study. Safety outcomes, including death at 90 days and intracerebral haemorrhage, were similar in both groups.

Lancet doi:10.1016/S0140-6736(22)01054-6

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Breast and ovarian surgery reduces cancer risk in women at high risk

The study

Uptake and efficacy of bilateral risk reducing surgery in unaffected female *BRCA1* and *BRCA2* carriers

Marcinkute R, Woodward ER, Gandhi A, et al

J Med Genet 2021;0:1-8

CPD READING
0.5 HOURS

NIHR | National Institute for Health and Care Research

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Why was this study needed?

Women with a strong family history of breast or ovarian cancer are at higher risk themselves. This might mean they carry a variant of disease of one of two genes (*BRCA1* and *BRCA2*).

Following a positive genetic test, women who are healthy, with no signs of cancer, are offered surgery to reduce their risk of developing cancer in future. They are advised to have fallopian tubes and ovaries removed once their family is complete. They can also have breasts removed. To reduce the risk of cancer, women with *BRCA1* mutations are advised to have this surgery by the age of 35; women with *BRCA2* mutations by the age of 40.

In this study, researchers looked at the effectiveness of the surgeries in preventing breast and ovarian cancer. They wanted to know how many women at high risk had surgery, and how long they waited after a positive test before deciding to.

What did the study do?

The study included 887 women born between 1930 and 2002. They did not have cancer but they had all received a positive test for cancer predisposing variants of the *BRCA1* or *BRCA2* gene.

The research team explored whether, and when, these women had breast or ovarian surgery. Women's records were studied for a maximum of 24 years from the time of their genetic test (the average follow-up was just over six years). The researchers noted deaths, and diagnoses of breast or ovarian cancer.

What did it find?

The study found that, 20 years after the genetic test, many women had undergone risk reduction surgery:

- More than half (58%) had breast surgery
- Four in five (79%) had ovarian surgery
- With increasing age, women became more likely to have ovarian surgery but less likely to have breast surgery.

Risk reduction surgery effectively reduced the risk of cancer:

- Only one in 100 of the women who had breast surgery was diagnosed with breast cancer afterwards; the procedure reduced their risk of breast cancer but not their overall risk of death
- No woman who had ovarian surgery was diagnosed with ovarian cancer; the procedure again reduced their risk of ovarian cancer but not their overall risk of death
- Ovarian surgery did not reduce the risk of breast cancer; this was unexpected as this surgery reduces levels of oestrogen (which can increase the risk of breast cancer).

Women waited more than two years on average after the genetic test before having surgery.

Why is this important?

Compared with previous work, increasing numbers of women are now opting to have risk reduction surgery. However, the average delay between receiving a positive genetic test and having surgery is more than two years.

This study gives a full picture of the decisions made by women at high risk of these cancers. The information could help other women with a positive genetic test.

Surgery effectively reduced women's risk of breast and ovarian cancer but it did not reduce their overall risk of dying compared with others in the study (who also had genes that put them at risk but chose not to have surgery). The researchers suggest this might be because women who did not have surgery would be particularly aware of the need for frequent screening. This would mean that any cancers are picked up and treated early.

What's next?

Further research is needed into the reasons why women delay having surgery. This knowledge would help clinicians and researchers address them and perhaps encourage women to have the surgery sooner.

The researchers say that the delay between a positive genetic test and surgery needs to be shortened. Risk reducing ovarian cancer surgery should be carried out once a woman's family is complete. It should be done shortly after a positive genetic test for women over 40 (if they have *BRCA2*) or around 35 (if they have *BRCA1*).

This study looked at *BRCA1* and *BRCA2*, but other genes also increase the risk of these cancers. Further work could explore whether a test for multiple high risk genes (a polygenic risk score) might influence decisions about surgery.

Some risk of cancer persists after risk reducing surgery. Preventive and screening strategies are still needed, the researchers say.

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PRACTICE POINTER

Immunity and infectivity in covid-19

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CPD READING
0.5 HOURS

Understanding how to assess and communicate risk of transmission and immunity against SARS-CoV-2 is important for all healthcare workers. The evolving evidence base regarding infectivity, risk of transmission, risk of reinfection (dependent on circulating variants), and immunity (influenced by post-infection and post-vaccination waning immunity) can make this very challenging.

There are several reasons why individuals with covid-19 and those caring for them are interested to understand whether they are still infectious:

- Individual concern about passing on infection to others
- Healthcare workers to make risk assessment before patient discharge or interventions
- Policy makers to provide risk reduction recommendations.

This article reviews core underlying principles and explains how interpretation of laboratory data—including polymerase chain reaction (PCR), antigen based lateral flow device (LFD), and antibody testing—can support discussions.

HOW PATIENTS WERE INVOLVED IN THE CREATION OF THIS ARTICLE

The article was reviewed by two patients. Their opinions were used to guide the focus of the article and to respond to main concerns. Also one patient wrote a perspective to highlight the considerations and concerns that a patient may have.

WHAT YOU NEED TO KNOW

- The risk of SARS-CoV-2 transmission is greatest just before symptom onset and in the early symptomatic period
- There is no surrogate marker to determine infectiousness: PCR positivity overestimates the duration of infectivity and can lead to negative consequences such as delayed surgery, delayed access to health care, and blocking of healthcare systems; culture is not practical; and negative lateral flow tests do not equate exactly with non-infectiousness
- Decisions related to transmission risk must take into account all relevant factors, including the overall risk of infection in the community, the individual's ability to comply with prevention measures, their home and work environment, and the risk profile of their likely future close contacts

When is an individual non-infectious?

There are insufficient data to precisely delineate when an individual is no longer infectious, and the risk is a continuum with considerable inter-person variability. Individual risk assessments will probably always be required (box 1) and will need to take into account the general risk of infection in the community, including risks posed by new variants (box 2).

Individuals are most infectious in the early stages of the illness, immediately before and shortly after the onset of symptoms.[1] Interventions that target this highest risk period (such as identification and behavioural modification of individuals with early disease) are likely to have the biggest impact in controlling transmission overall. Infectivity and viral load decline from the onset of symptoms.[1 2] In one study, no transmissions occurred after day five of symptoms even in household contacts.[3] In mild to moderate cases, individuals are considered highly unlikely to be infectious beyond 10 days.[4 5] Over-emphasis on the latter stages of recovery (for example, demonstrating PCR negativity in recovering patients) is unlikely to have a significant impact on transmission and can lead to negative unintended consequences, such as delayed surgery, delayed access to health care, and blocking of healthcare systems. It may still have a place in certain circumstances (for example, among immunocompromised patients).

Guidelines worldwide provide recommendations on when it is safe to return to work, broadly based on the likely infectious period.[6-11] These guidelines continue to evolve

Box 1 | What to consider when a patient asks if they are still infectious

- The reason for the question—explore the patient's concerns and the specific nature of the inquiry
- The consequences of labelling the individual as "infectious" (psychological, staffing levels, delayed discharge, delayed surgery, etc)
- The consequences of not regarding the individual as potentially infectious
- The risk from this individual relative to the wider community risk
- The results of tests such as PCR, antigen, and antibody (surrogate markers only)
- Discuss infectiousness in terms of levels of risk
- Advise on measures to mitigate that risk (such as cough hygiene, social distancing, mask/face covering (different grades of mask offer different levels of protection), eye protection, hand hygiene)
- Advise that, although patients may have lingering symptoms after infection that are troublesome, these are not indicative of ongoing infection or ongoing infectiousness

and can be referenced for up-to-date information. There is no longer a legal requirement in the UK for someone who has covid-19 to self isolate, although it is still recommended.[9] In Wales, healthcare workers are advised to self isolate and to return to work when they have two negative lateral flow test results taken 24 hours apart, starting five days after the date of their initial positive test. Those who continue to test positive are advised to continue testing up to day 10. If they are still positive at that point, they are considered unlikely to still be infectious and they can return to work providing they are medically fit.[9]

Patients in hospital are typically kept in isolation for 10 days from the onset of symptoms (14 days for those who are severely immunocompromised); they are then able to stop isolating providing that they have been afebrile for 48 hours and all their symptoms (except for cough and anosmia) have resolved. This can be reduced if they meet these clinical criteria and have two negative lateral flow test results taken 24 hours apart, starting six days after the date of their initial test.[10]

International travel and schools are other areas where transmission risk has been scrutinised. In the case of international travel the concern is primarily related to spread of infectious variants with varying degrees of ability to infect vaccinated individuals. There is still potential for global spread of a more virulent variant of SARS-CoV-2. However, the omicron wave has largely tempered those fears for now. In addition, attempts to prevent infiltration of variants through travel restrictions have to date been largely unsuccessful apart from in countries where very strict travel restrictions are put in place before any threat of introduction of the new variant (for example, New Zealand). Risks of transmission in schools need to be balanced against the negative impact on children's mental wellbeing and education, particularly given that most children are at low risk of complications from covid-19.

Are all individuals equally infectious?

Individuals are not equally infectious. Onward transmission varies according to specific host and contact factors and the nature of the exposure. Transmission is primarily related to direct contact with an infected individual. In one study, transmission rates on trains were highest in those in adjacent seats (attack rate 3.5% (range 0 to 10.3%)) and increased with time (0.15% per hour) and proximity.[12] Transmission in passengers who immediately occupied a positive individual's vacated seat occurred in only one out of 1342 cases (0.075%).[12] Household contacts (11.8%) are more likely than non-household contacts (1.2%) to develop disease.[13]

Investigations of outbreaks have demonstrated very high attack rates in specific settings.[14-16] These large scale, "super-spreader" events[14-16] are characterised by explosive early growth and sustained transmission in later stages,[17] with 20% of infected individuals triggering 80% of all infections.[18] As transmission is unpredictable and random in nature (stochastic), exercise caution to not over-interpret data from small groups.[19]

Box 2 | Example of an individual risk assessment of infectiousness

An immunocompetent individual who had mild disease and has now recovered after seven days asks you when they will no longer be infectious. They work in retail, sing in a choir, and are the main carer of an elderly relative, for whom they do not have a reliable alternative carer. They are worried about passing on infection to their work colleagues, friends in the choir, and their elderly relative.

Advice for the patient

- We do not have an exact cut-off point for when someone is no longer infectious. However, in one study of people with mild disease no transmissions occurred five days after the onset of symptoms. Analysis of other data has led scientists to conclude that transmission after 10 days is extremely unlikely.
- You can definitely return to your job in retail after 10 days, as per government advice. You are extremely unlikely to be infectious. You are in fact much less of a risk than other people who haven't had the virus yet as, if they get infected, they may be unaware but be in the most infectious stage, which happens early on.
- Even though you are very unlikely to be infectious, you might want to delay returning to the choir, perhaps until after three weeks. This is simply because you can avoid the choir without any significant detriment to anybody, singing is known to increase the risk of transmission, and even though transmission after day 10 is extremely unlikely, the longer the interval since the time of infection the lower the risk. The virus has been cultured in one immunocompetent individual 18 days after symptom onset, which is why I have suggested three weeks. Similarly, you may decide to delay visiting elderly or vulnerable family members who you don't need to visit because of the very small potential risk.
- However, you are the main carer of one elderly relative, and it is important that you can visit them because there is a risk of harm if you are not able to look after them. You can resume caring for them, as you are extremely unlikely to be infectious at this stage. I would suggest that you pay careful attention to the various preventive measures (social distancing, mask wearing, and hand hygiene) as an additional precaution.

Individuals are most infectious just before and just after symptom onset

What other factors affect the risk of transmission?

Transmission is influenced by external factors, which should be considered as part of any assessment:

- Prevention measures—masks,[20] social distancing, vaccination status, hand hygiene, etc
- The activity being undertaken (such as choir)
- The environment (higher risk in crowded or shared facilities and if ventilation is poor)
- The susceptibility and risk of severe disease among contacts.

Individuals are most infectious just before and just after symptom onset. Infectivity decreases thereafter, with transmission after day 10 considered extremely unlikely following mild or moderate disease. Immunocompromised people and those with severe disease are likely to be infectious for a longer, undefined period. Resolution of symptoms is reassuring, signifying development of immunity with likely reduced risk of transmission. Other preventive measures (hand hygiene, mask wearing, social distancing) reduce residual risk further.

What surrogate markers are used to decide on infectivity?

There is currently no ideal surrogate marker for infectiousness. Viral culture is not a routinely available test in most settings. PCR overestimates the duration of infectiousness but can underestimate risk by virtue of false negative results. Lateral flow devices (LFDs) identify the most infectious individuals reliably but don't detect all infectious individuals. LFDs do not have the same issues of residual positivity as PCR.

Culture

Most recommendations are based on viral PCR and culture. Viral culture confirms the presence of intact, viable, and potentially infectious virus. Although the circumstances required for viral culture are not the same as for transmission, it is considered a reasonable surrogate. In immunocompetent individuals, positive culture beyond day 10 in patients with mild disease is uncommon.[4] It is more common in those with severe disease.[25 32-34] Virus has been detected up to day 18 in mild disease,[23 24] day 111 in severe disease,[25] and day 119 in an immunocompromised individual.[21 22] Individuals may not be very infectious even when culturable virus is present. One individual with severe infection who was culture-positive at day 111 did not cause any secondary infections despite quarantine termination at three months.[25] Also, no infections occurred in 852 contacts exposed to individuals with mild disease after day five.[3]

Polymerase chain reaction

PCR detects the presence of SARS-CoV-2 viral RNA. Previously, guidelines advocated use of PCR as a surrogate for non-infectiousness but studies on viral dynamics have shown that there are several reasons why this is not appropriate.

- PCR can detect non-viable virus and overestimates the duration of infectivity,[3 27 28 30] with one surveillance study reporting no secondary cases among 790 contacts of 285 "persistently positive" people.[35] Relying on PCR as a measure of non-infectiousness may prolong hospital admission and isolation unnecessarily.[29]
- Results can fluctuate from positive to negative at all stages of infection, can become positive again even after two consecutive negative tests,[22 36 37] can be detected for longer in those with severe infection,[21 38] and may fluctuate at the level of detection for several weeks.[39]

Most people will be protected from symptomatic reinfection for at least five months, and the immediate risk of reinfection is low

Box 3 | What factors can you discuss when asked by a patient if they are immune?

- What is known about the response to SARS-CoV-2 (that is, immunity lasts at least 90 days and likely longer in most people)
- The different types of immunity (T cell and antibody)
- That current tests are only surrogate markers for immunity and do not take account of immune memory
- Reinfections can occur
- Reinfections are often milder than the first episode
- Recovered individuals should comply with prevention measures to avoid reinfection

- Results vary according to sample site (lower respiratory tract samples remaining positive for longer).[37]
- False negative results can provide false reassurance.[30]

Results can be semi-quantified by the number of cycles required to reach the predetermined positive threshold—the cycle threshold (CT). Low CT values indicate high viral loads (strong positive <25); high CT values (>35) may indicate low viral loads (weak positive). Weak positive results are most common in the very early and late stages of infection but may also be false positives.[40] The CT value is probably linked to infectiousness[29 41]; supported by decreased ability to culture the virus as the CT value increases[4 5 24 32 41] and as found with other diseases.[42] The CT value is affected by some external factors, such as swab quality and disease stage (lower in early disease but may be rising), so results need to be interpreted with caution.

Lateral flow devices

LFD antigen tests detect a protein antigen which forms part of the viral wall. When present, it is indicative of ongoing replication and therefore the presence of infectious virus. Comparative studies have shown that it is less sensitive than PCR, detecting around 65-89% of PCR-positive samples.[43] However, the sensitivity is higher in those with higher viral loads (96% for >1 000 000 copies per mL, 92% for 10 000–1 000 000 copies per mL, and 43% for <10 000 copies per mL[44]) and those who were culture positive (>95%).[43] It has been estimated that LFD tests would detect 83-89% of cases with PCR-positive contacts.[45] The rapid turnaround time and practicality of lateral flow tests mean they provide a reasonable testing strategy for reducing infection risk in certain circumstances—such as when PCR testing is not practical, when the consequences of a false negative result are acceptable, and when the balance of risks (immediate LFD result *v* delayed PCR result) favours their use.

When are individuals considered to be immune?

Individuals are understandably keen to know whether they are susceptible to reinfection (box 3). Reinfection with phylogenetically distinct variants of SARS-CoV-2 has been reported after as little as 48 days[46] in an otherwise healthy 25 year old man. Asymptomatic reinfection (PCR positivity)[47 48] and infection with milder disease[49 50] and more severe disease[46 50] have all been described. Over time, infection and reinfection have resulted in milder disease at the population level, which is probably related to improved immunity combined with reduced virulence of emerging strains. Reinfection is more likely to be established in individuals with symptoms and more severe disease. The risk of reinfection is a function of the level of immunity present and the infecting viral strain (for example, vaccine escape variants), which is in turn dependent on the strain(s) circulating in the community at that time. Immunity decreases with time from infection or vaccination. Reinfection is more likely when a new strain emerges, particularly if that strain has properties that enable it to evade immunity developed from previous

PATIENT PERSPECTIVE: UNCERTAINTY ABOUT IMMUNITY

When I discovered I had covid-19, I had numerous symptoms and remained unwell for a protracted period. The symptoms lifted suddenly after five and a half months when I woke up feeling better.

When I started to go out, I was extremely cautious despite it being weeks since the onset of my symptoms. I was conscious of not touching any walls—what if an elderly person touched the same wall hours later, caught the virus from me, and died? If someone walked down the street, I gave them a wide berth. I questioned whether it was irresponsible of me to leave the house for a walk on my road—I checked and double-checked the guidance.

I still have mixed feelings about how information on immunity affects my decision making. It is now six months since the onset of my symptoms. Part of my confidence in visiting vulnerable relatives comes from a sense that I am less likely to pass covid on to them unknowingly because I am less likely to get infected again. But then I worry about reinfections—what if I get covid again but have very few symptoms and unknowingly spread it? The uncertainty about immunity makes some decision making hard—who to see and when. What happens when our immunity runs out? And will I ever know when this happens? I do not feel that having had covid removes much of this uncertainty. It hasn't really added much confidence for me, as I still have so many unanswered questions.

infection or vaccination. An example of this was seen with the rapid spread of the omicron variant in late 2021.

Most people will be protected from symptomatic reinfection for at least five months, and the immediate risk of reinfection is low (0.02%, incidence rate 0.36 per 10 000 person weeks).[51 52] There is evidence of increased protection from infection in individuals who are vaccinated after a primary infection, with one prospective cohort study showing that infection-acquired immunity waned after one year in unvaccinated participants but remained consistently higher than 90% in those who were subsequently vaccinated, even in people infected more than 18 months previously.[53]

Immunity in coronavirus infections

Evidence from infections with other coronaviruses (seasonal coronaviruses, MERS-CoV, SARS-CoV-1) and surrogate markers of immunity (antibody and T cell responses) can help inform our understanding of immunity in SARS-CoV-2.

Seasonal coronavirus

Serological studies from the 1960s suggest cycling of infection, with different coronavirus strains predominating every two to four years.[54] Re-challenge experiments suggest complete immunity from symptomatic reinfection for at least one year if "reinfected" with the same strain, but only partial immunity when exposed to a heterologous strain.[55 56] Short duration asymptomatic shedding is possible following re-challenge with the same strain.[59]

Immunity to seasonal coronavirus is not lifelong.[59] Most children are seropositive for seasonal coronavirus by age 3.5 years, yet seasonal coronavirus infections account for ~25% of acute respiratory illness into adulthood.[59]

SARS-CoV-2

Data on immune response to infection and vaccination are continuing to evolve. Presence of antibody is not proof of immunity. Neutralising antibody tests are considered most predictive of protection but are not available routinely. Neutralising antibodies develop in most infected individuals (>90%),[60] although in some the levels are very low or absent,[61] suggesting that other elements of the immune system are driving recovery.

Antibody responses are stronger and last longer after severe infection.[62] Given the protective nature of antibodies in seasonal coronavirus infection, we might expect protection against the same strain to last for most people for at least 12 months. However, viral evolution may be more frequent and common in the early phases of the pandemic, and immunity akin to that seen in studies of seasonal coronavirus in adults may take time to develop.

There are currently four approved vaccines in the UK[63] and more available worldwide. Data from vaccination studies show that protection wanes over time but lasts in most people for at least four months.[64] Pfizer vaccine was effective against symptomatic disease in 96% up to two months, 90% for two to four months, and 84% for four to six months. Protective efficacy of the vaccine from symptomatic disease varies according to viral strain and patient age in the range of 70%[65] to 95%.[64] Protection against severe infection, hospitalisation, and death is higher still. At the time of writing vaccination has proved effective against all naturally circulating strains. Evidence regarding the efficacy against the latest variant (omicron) is continuing to emerge, although protection is definitely reduced.[66] Immunity derived from vaccination declines over time. In recognition of this, the UK Joint Committee on Vaccination and Immunisation has recommended a fourth vaccine dose (spring booster approximately six months after the previous dose) for those at higher risk of covid-19. This will likely be repeated in the autumn. Decisions on booster vaccinations for the general population will be made in response to evolving evidence.

In summary, infection with coronaviruses does not result in lifelong immunity, and reinfection is common. The natural course for coronavirus infection includes repeat exposure and repeat infection over a variable time course. Over time, SARS-CoV-2 will likely transform into a seasonal coronavirus infection. With the development of increased immunity the risk of re-exposure and reinfection will decline, and the period between episodes will likely increase.

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EDUCATION INTO PRACTICE

- How would you discuss the uncertainty around immunity with your patients?
- How do you use viral detection tests (PCR, lateral flow, and other viral antigen tests) when discussing risk of transmission with patients?
- Reflect on a recent case of covid-19 where the individual was worried about onward transmission or duration of immunity? Would you do anything differently having read this article?

GUIDELINES

Social work with adults experiencing complex needs: summary of NICE guidance

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Further information about the guidance, a list of members of the guideline development group, and the supporting evidence statements are in the full version on bmj.com

CPD READING
0.5 HOURS

Social work encompasses a range of interventions aimed at improving people's lives. Social workers use these interventions to help people maintain or achieve independence and social functioning. They can be involved in all aspects of a person's care, such as assessing needs and arranging care, at hospital discharge, planning for the future, and supporting social connections, all with the aim of improving overall health and wellbeing.

Definitions as used in the context of this guideline

Adults with complex needs
People aged 18 or over who need a high level of support with many aspects of their daily life and rely on a range of health and social care services. This may be because of illness, disability, broader life circumstances, or a combination of these. Complex needs may be present from birth or develop over the course of a person's life, and may fluctuate

Organisations
Bodies that employ social workers in a professional capacity. This can include local authority social care departments, health services, the criminal justice system, higher and further education, and voluntary and community services

HOW PEOPLE WITH LIVED EXPERIENCE WERE INVOLVED IN THE CREATION OF THIS GUIDELINE

Committee members involved in this guideline included three lay members with lived experience who contributed to the formulation of the recommendations summarised here.

WHAT YOU NEED TO KNOW

- The new NICE guideline supports integrated working between general practitioners and social workers
- A named social worker can help to provide continuity and ongoing support by identifying and meeting needs and helping to avoid deterioration and admission to hospital
- Social workers can help people with complex needs create meaningful social connections, potentially resolving some unmet social needs
- Recommendations from NICE complement the NHS long term plan to create new partnerships between organisations that meet health and care needs

A person's social care and healthcare needs are intrinsically linked. Yet, historically the health and social care systems in the UK have functioned as separate entities, often with little communication between the two. One of the goals of the NHS Long Term Plan[1] is the provision of integrated care, joining up the health, social care, and voluntary sectors.

In response to these changes, the National Institute for Health and Care Excellence (NICE) has produced a guideline to provide evidence based recommendations to support social work interventions for adults with complex needs. Recommendations in the guideline are not limited to specific conditions or social situations, and are relevant for all adults whose needs and difficulties are serious enough to require a high level of support from both health and social care services for various aspects of their daily life (the box gives definitions). The guidance includes recommendations on how social workers, general practitioners (GPs), and other primary care professionals can work together to address a person's health and social care needs. The guideline also covers recommendations on future planning, supporting people to connect with local communities, and reducing isolation.

Communication, support, and collaboration

In existing systems, GPs may not know how best to contact a social worker, may not receive updated care plans from social workers, or may not know their patients are in touch with social workers. Closer integration of health and social care is an opportunity to improve communication between social workers and GPs and primary care. NICE recommendations aim to support successful integrated working and highlight several ways in which organisations can support effective communication within a multidisciplinary team (MDT). One way of supporting communication within the MDT is through a named social worker (see section on "Supporting people to plan for the future").

Organisations should ensure clear communication within the MDT by:

- Holding MDT meetings, including case discussions
- Having mutual access to diaries when possible
- Providing virtual means to stay in touch even when team members are working from different locations
- Making use of informal opportunities to communicate (for example, staff networking events).

The committee made recommendations about defining the social worker role and strengthening accountability when working within MDTs.

Organisations should support social workers in defining their role within MDTs by:

- Providing professional social work supervision, in particular when the team manager is not a social worker
- Providing opportunities for peer supervision
- Making joint training available that provides clarity about the role of the social worker within an MDT
- Providing bespoke, continuing professional development for social workers
- Recognising and addressing differences in organisational culture between professionals involved in the team
- Organisations should develop shared formal agreements (including budgets and information sharing) early in the process of establishing integrated working to underpin accountability and decision making.

Supporting people to plan for the future

Social workers have a key role in ensuring that people with complex needs experience a thorough assessment of their needs and eligibility for care, which they are entitled to under the Care Act 2014.[3] Social workers also coordinate resulting care to address the person's support needs. People in these circumstances experience needs that are wide ranging and often changing, and GP services alone are often not sufficient to address them all, especially in the current context of time constraints in GP appointments.[4] A lack of appropriate support can result in escalations, crises, and admissions to hospital.

Recommendations in the NICE guideline are in line with the NHS Long Term Plan[1] to place "…social work teams at the beginning of the acute hospital pathway."

The NICE guideline[2] supports having a named social worker. This is beneficial for the person with complex needs in terms of continuity of care and, as described above, supports successful integrated working within the MDT. Contact between members of the team and sharing information becomes more efficient when people know who to speak to. Further benefits include contributions to the care plan from all members of the MDT, ensuring all of a person's needs are recognised, addressed, and reviewed—for example, if needs change.

Social workers should respond to the person and their changing circumstances by:

- Developing a plan that is flexible and responsive
- Reviewing and revising the care plan in response to fluctuating, evolving, or rapid changes
- Developing and identifying options according to the person's needs, wishes, and preferences (for example, by helping people connect with local communities as described in the section on helping people to connect with local communities and to reduce isolation)
- Ensuring consistency of care by integrating working across the range of health and social care services involved (see the section on the social worker's role in MDTs).

A lack of appropriate support can result in escalations, crises, and admissions to hospital

Social workers should ensure that, at time of writing or review, care plans:

- Take account of the person's wishes and preferences
- State how the person's eligible and non-eligible needs would be best met
- Identify how arrangements will be made to meet eligible needs
- Record any eligible needs that appear unlikely to be met or only partially met, the reasons they cannot be met or only partially met, and any potential actions that would allow them to be met in the future.

The social worker should plan the review date of the care plan with the person (a review should happen at least once a year), or conduct an unplanned review as soon as possible if, for example:

- The person's needs escalate or reduce, and circumstances change (for example, after transfer from hospital)
- The person or their carer, a family member, advocate, or another person important to them requests it
- Where possible, organisations should provide people who receive social work support with a named social worker.

Helping people to connect with local communities and reduce isolation

Social prescribing services are used by GPs to help patients to access support from the community. The NHS Plan[1] promises an expansion of social prescribing link worker roles to meet a target of 900 000 referrals by 2024. However, the brief contact and signposting approach offered by primary care social prescribing may not be sufficient for many people with complex needs. Social workers can provide more sustained and detailed support to provide appropriate help with developing social connections for those with the most complex needs, which can complement the lower intensity support provided by social prescribing services to a wider patient group. The guideline also highlights the social worker role in advocating to commissioners for particular community resources, and thinking creatively about how personal budgets can be used. Social workers can thus support GPs and social prescribers to identify and address local unmet needs for resources that require funding. In this way, GPs and social workers can influence the commissioning landscape, contributing towards developing networks and opportunities that are meaningful to people experiencing complex needs.

To help people with complex needs develop social connections, social workers should talk to them about their social networks, strengths (using strengths and asset based approaches), and preferences for activities and social contact.

Competing interests: See https://www.nice.org.uk/about/who-we-are/policies-and-procedures.

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Find the full version with references at http://dx.doi.org/10.1136/bmj.o1077

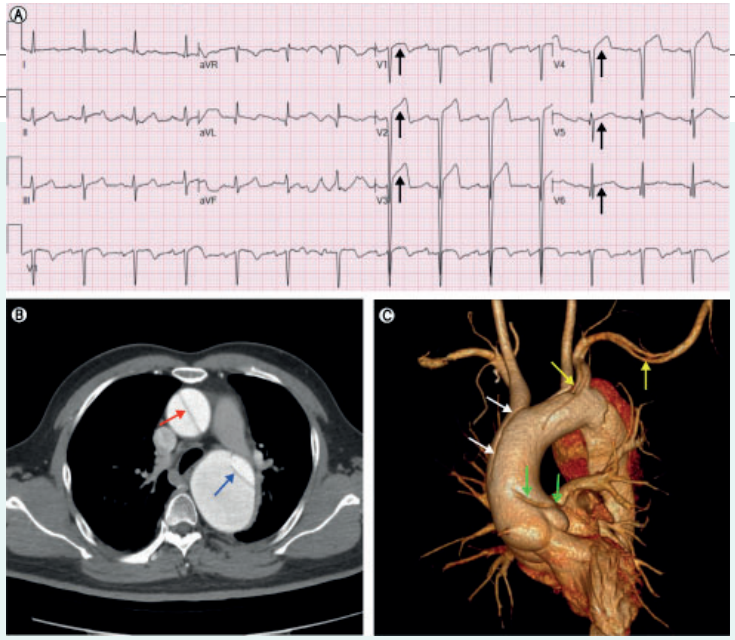
CASE REVIEW

A young man with sudden onset persistent chest pain

A man in his 30s presented to the emergency department with sudden onset chest pain lasting for six hours. His pain was greatest at onset and he described it as an intense pressure radiating to the back. The pain did not relate to inspiration. He also experienced a transient loss of consciousness, and reported no previous episodes of chest pain or history of hypertension or diabetes. During physical examination, pulse asymmetry (weaker on the left) was observed, along with radio-radial delay. His blood pressure was 156/108 mm Hg in the right arm and 115/71 mm Hg in the left. His oxygen saturation was 98% in room air. Echocardiography showed wall motion abnormalities, and left ventricular ejection fraction was 39%. The structure of the aortic valve was normal.

Laboratory investigations were made, which showed his troponin level was elevated. Electrocardiogram (ECG) and contrast enhanced chest computed tomographic angiography (CTA) images are shown in the figure.

1 **What does the ECG show?**
2 **What are the differential diagnoses?**
3 **What radiological investigations might be considered?**



Electrocardiogram and contrast enhanced chest computed tomographic angiography (CTA) of the thorax on patient's admission to the emergency department. (A) Electrocardiogram. (B) CTA showing the ascending aorta (red arrow) and descending aorta (blue arrow) divided by the torn intima into two cavities. (C) 3D image reconstruction of CTA showing torn aortic intima at the opening of the left main coronary artery (green arrows) and the right brachiocephalic artery (white arrows). In addition, the left subclavian artery (yellow arrows) is also divided into two cavities by the torn intima

Submitted by Chuan-Hai Zhang, Hao Wang, and Zhaolong Xu

Next of kin consent obtained.

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answers

CASE REVIEW **A young man with sudden onset persistent chest pain**

1 What does the ECG show?

The ECG (fig A) shows a sinus rhythm with an ST-segment elevation (STE) and Q waves in leads V1 to V6.

2 What are the most likely diagnoses?

Aortic dissection, suggested by radiation of the chest pain to the back and the torn intima of the aorta on CTA; and acute anterior wall ST segment elevation myocardial infarction (STEMI) (suggested by the above ECG findings) (fig A, B, C).

When the coronary artery is affected, myocardial ischaemia or infarction (STEMI or non-STEMI) may occur. Approximately 2.5% of patients with type A aortic dissection (involving the ascending aorta) may progress to STEMI.

In this case, involvement of the left main coronary, right brachiocephalic, and left subclavian arteries suggests that this is a type A dissection, and explains the syncope and unequal bilateral blood pressure.

When the descending aorta is involved it is classed as a type B dissection.

Depending on which branches of the aorta are affected, ischaemia of other organs and various non-specific associated symptoms may be present.

The aortic dissection detection risk score (ADD-RS) may be used to assess the pre-test probability of aortic dissection (table, see bmj.com). Based on ADD-RS, patients can be classified as ADD-RS ≤1 (low probability of aortic dissection) and ADD-RS ≥1 (high probability). No specific ECG changes are visible in aortic dissection.

3 What imaging or other investigations are recommended?

Computed tomography angiogram of the chest and abdomen is recommended by 2021 guidelines for diagnosis of aortic dissection, classification, and treatment planning. Consider transoesophageal echocardiography or cardiovascular magnetic resonance if computed tomography is contraindicated or unavailable. Transoesophageal echocardiography provides a more complete view of the aortic component.

LEARNING POINTS

- Consider aortic dissection when a patient has pulse asymmetry, systolic blood pressure differential, and radio radial delay.
- If aortic dissection involves the coronary artery, myocardial infarction may occur.

PATIENT OUTCOME

See bmj.com/endgames

CPD READING
0.5 HOURS

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LEARNING MODULE

Articles with a "learning module" logo have a linked BMJ Learning module at http://learning.bmj.com.

MINERVA

Pneumothoraces, pneumomediastinum, and subcutaneous emphysema

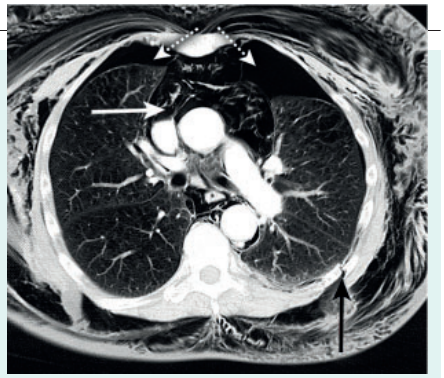
This is an axial computed tomography (CT) image of the chest of a woman in her 70s showing bilateral pneumothoraces, pneumomediastinum, and subcutaneous emphysema after a fracture of the left eighth rib.

She presented with extensive swelling of the torso and face after a fall from standing height, and reported breathlessness, voice change, and difficulty swallowing. Initial chest radiograph showed extensive subcutaneous emphysema and moderate pneumomediastinum. Computed tomography showed bilateral pneumothoraces (dotted white arrows), pneumomediastinum (white arrow), and extensive subcutaneous emphysema of the face, neck, torso, and upper limbs. These findings were assumed to be secondary to a posterior left eighth rib fracture (black arrow).

The patient was treated with urgent insertion of a left sided surgical chest drain.

The cause of subcutaneous emphysema and associated problems (such as pneumomediastinum and pneumothoraces) might not be readily apparent on plain chest radiography, so in the presence of surgical emphysema, CT imaging of the chest and mediastinum is warranted.

Primary treatment is targeted at the underlying cause; in this instance, an intercostal drain insertion for a traumatic pneumothorax.



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Patient consent obtained.

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If you would like to write a Minerva picture case, please see our author guidelines at http://bit.ly/29HCBAL and submit online at http://bit.ly/29yyGSx

If you would like to write a Case Review or Spot Diagnosis for Endgames, please see our author guidelines at http://bit.ly/29HCBAL

Function of the claustrum

The claustrum is a thin sheet of grey matter located between the insular cortex and the putamen. It is reciprocally connected to all areas of the neocortex but its function is largely a mystery. A systematic review of the effects of lesions of the claustrum identifies a wide range of signs and symptoms, including changes in cognitive, perceptual, and motor abilities, and in mood and sleep. The rather general conclusion is that the claustrum regulates cortical excitability (*Brain* doi:10.1093/brain/awac114).

Air pollutants and acute coronary syndrome

A huge case crossover study from China (more than one million patients from 2000 hospitals in 300 cities) links transient increases in exposures to fine particulate matter, nitrogen dioxide, sulphur dioxide, and carbon monoxide to the timing of the onset of acute coronary syndrome. The association was strongest for nitrogen dioxide, where an increase of one interquartile range in concentration in the previous 24 hours raised the risk by around 4% (*Circulation* doi:10.1161/CIRCULATIONAHA.121.057179).

Impact of shielding on mental health

During the covid-19 pandemic in the UK, older and vulnerable people were instructed to shield or stay at home. Data from the English Longitudinal Study of Ageing show that any benefit from this restriction came at the cost of poorer mental health. People who were shielding were twice as likely to report depressive symptoms as those who weren't. They also had higher levels of anxiety and a lower quality of life (*Br J Psychiatry* doi:10.1192/bjp.2022.44).

Self-reported memory difficulties

Subjective cognitive difficulties, defined as the self-report of deterioration in memory or other domains of cognition in the absence of any objective deficit, can be an early precursor of dementia, according to a longitudinal study of 6000 middle aged people in Saarland, Germany. Over 17 years of follow-up, nearly 500 participants were diagnosed with dementia. People who had complained of subjective cognitive problems at the time of recruitment were around twice as likely to receive this diagnosis (*Age Ageing* doi:10.1093/ageing/afac113).

Glucose intolerance in pregnancy and offspring obesity

A longitudinal study from Israel of 33 000 mother-offspring pairs finds that rates of overweight and obesity in the offspring in late adolescence were related to levels of glycaemia in their mothers during pregnancy. Adjustment for offspring birth weight and sociodemographic variables did not modify these results substantially. Associations became more pronounced as the degree of obesity increased (*Diabetes Care* doi:10.2337/dc21-2634).

Losartan for pulmonary emphysema

Mice exposed to cigarette smoke develop emphysema that can be reversed by angiotensin receptor blockers. Disappointingly, a trial of losartan fails to identify a similar benefit in humans with emphysema. The primary outcome—evidence of progression of emphysema on high resolution computed tomography over 48 weeks—was no better in the group receiving losartan than in those on placebo (*Am J Respir Crit Care Med* doi:10.1164/rccm.202201-0206OC).

Downsides of immortality

Some years ago, in a Christmas edition, *The BMJ* published an essay—*How to live for ever*—that mocked the long history of attempts to achieve immortality (*BMJ* doi:10.1136/bmj.321.7276.1580). Minerva enjoyed a short story in *Nature,* about a 400 year old woman called Hilda, which makes the same point in a different way. Hilda can no longer keep up with knitting blankets for her many descendants. She's bored with knitting. Indeed, she's bored with the whole business of eternity. So she's disappointed when she learns that her choice of death day has been postponed (https://www.nature.com/articles/d41586-022-01437-0).

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