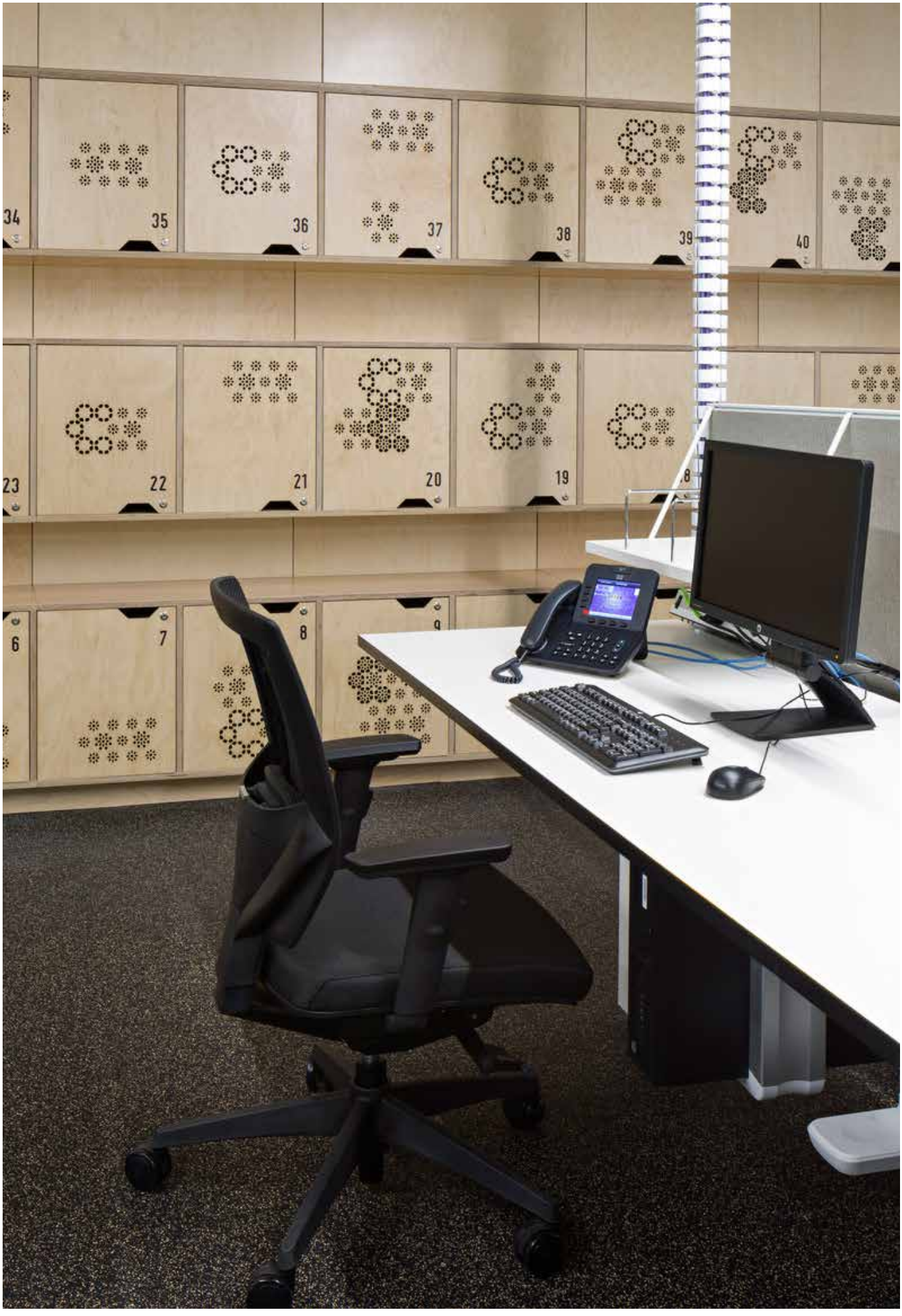
Redesigning hospitals for the digital revolution we just had

Australian healthcare workers' experiences of telehealth in 2020

Hassell/Centre for Online Health/The University of Queensland



Redesigning hospitals for the digital revolution we just had

Contents

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INTRODUCTION

The global health, social and economic consequences of COVID-19 have been, and will continue to be, devastating.

But in the midst of dealing with extreme demand and infection control issues, many healthcare systems have delivered long-anticipated telehealth services. Digital health is having its moment at last. Even as the pandemic crisis passes, exponential growth in the sector will drive permanent change.

This research explores the experiences of Australian healthcare workers in 2020, and their expectations for telehealth spaces in the future. We found that hospitals will need to adapt existing spaces (or build new ones) to provide the privacy and flexibility required to accommodate new ways of working.

Wait – what just happened?

As the pandemic situation deteriorated around the world in early 2020, the Australian Government followed the lead of many others and made telehealth services a standard offering during the initial shutdown of face-to-face healthcare. Finding it both necessary and convenient, patients and clinicians across Australia embraced the change.

By November, after 40 million digital consultations, the government declared access to Medicare-funded telehealth permanent.[1]

General Practitioner consultations made up around 30 per cent of all telehealth consultations, with the remainder delivered by specialists, allied health, mental health and other practitioners.[2]

In the early months of the pandemic, hospital administrators all over the world scrambled to upgrade IT systems and up-skill staff to deliver more online services. It's only now that thoughts are turning to what this digital revolution means for hospital design. Specifically, what this means for spaces that patients and staff have, up until this year, taken for granted, like large waiting areas and assessment rooms –and those that they've never needed, like dedicated space for telehealth.

Hospitals may or may not change in size in response to a sustained increase in telehealth services, but our research indicates they will almost certainly alter in layout.

A quick word about words

Terminology about digital health varies across locations and services. Just to be clear, this is what we mean when we talk about different types of care in this paper.

- → Telehealth – telephone or video consultations with patients (or other clinicians) in different locations
- → Home-based care – healthcare staff visiting patients in the home
- → Hospital-based care – in-person consultations or treatment at a hospital or health facility

There are other aspects of digital health that we don't address here, like remote monitoring of patients, wearable technology, remote surgery, and robotic assistants to name just a few. The list is long and getting longer.

Telehealth has been available for many years in some form or another, starting with the humble phone call from a doctor.

Aside from the obvious benefits of infection control that have proved so valuable during the pandemic, online or phone consultations allow equitable access to disadvantaged and remote patients, more efficient use of the workforce, and more suitable care for the aged or chronically ill.[3]

Prior to the pandemic, and despite being proven to be safe and effective for a range of health conditions,[4] telehealth uptake had been slow because healthcare systems are large, complex and risk averse. But the pandemic has forced a transformation that will be hard to roll back.

This paper explores the experiences of practitioners in hospital settings. It's our contribution to understanding the challenges and opportunities of telehealth, and how it will change facility design.

St Vincent's Private Hospital New East Wing, Sydney, Australia
Photography by Simon Wood

HEADLINE FINDINGS

Our research findings shed light on how healthcare staff experienced a transformational period in their work lives. It confirmed many hunches about the benefits and challenges of telehealth, and gave us hints for future scenarios of hospital design.

Western Australia Cancer Centre, Perth, Australia
Photography by Douglas Mark Black

1. There is no turning back

Telehealth services are expected to continue at significantly higher levels than before the pandemic.

2. We need both modes, for now

Spatial flexibility is important to allow both telehealth and in-person consultations. However, this may change as hospitals move toward more telehealth service offerings and home-based care.

3. It's confidential

Visual and acoustic privacy in a telehealth setting are critical for both patients and staff.

4. More and better spaces please!

There is a lack of dedicated telehealth spaces in hospitals, and the quality of existing spaces varies substantially across facilities.

5. The wait is over

Fewer patients visiting hospitals may lead to less public waiting space and more clinical space.

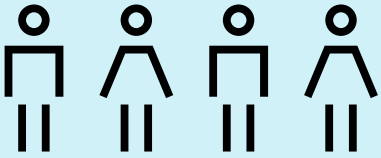
"We are designing part of the new hospital to have activity-based working. There'll be areas where you go to for the type of work you're doing, rather than areas that you sit in irrespective of what you're doing."

68%

of survey participants' services delivered by telehealth during 2020

77

survey participants



"A lot was rearranged to suit the clients during COVID. So it was more patient-centred."

"At the moment we have someone working in a cupboard one day a week. Like, it's an actual storage cupboard."

38%

of survey respondents prefer to deliver telehealth in a consultation room

WHAT WE DID

Information about telehealth space design in hospitals is hard to come by. Most telehealth research projects investigate the barriers, safety or efficacy of initiatives, rather than the spatial implications of changes to models of care, which is the focus of this report.

Compounding a lack of telehealth design research, the Australasian Health Facility Guidelines refer in various sections to telehealth in only general terms, (e.g. 'consider telehealth requirements', 'telehealth technology should be available for teaching and clinical assessment')[5] without recommendations of size, layout, lighting, acoustic or other design considerations.

The assumption is that staff can just jump on a computer or phone in whatever space is available and make the best of it. But when the COVID-19 crisis came, what spaces were actually available and did they work?

Hassell collaborated with the Centre for Online Health, Centre for Health Services Research at The University of Queensland to understand where and how digital consultations were undertaken in Australia in 2020.

Were the spaces the clinicians used appropriate for the patients? Will hospitals need to rethink their spaces to accommodate this new model of care? And most importantly, how can we take advantage of this significant change in healthcare delivery to design hospitals that best support clinicians and patients?

Survey and interviews

The Centre for Online Health surveyed 77 healthcare workers in Australian hospitals about their telehealth experiences during 2020, and their expectations for digital services in the future. Seven of those participants also agreed to be interviewed to better understand how telehealth spaces worked (or not) for them and their colleagues.

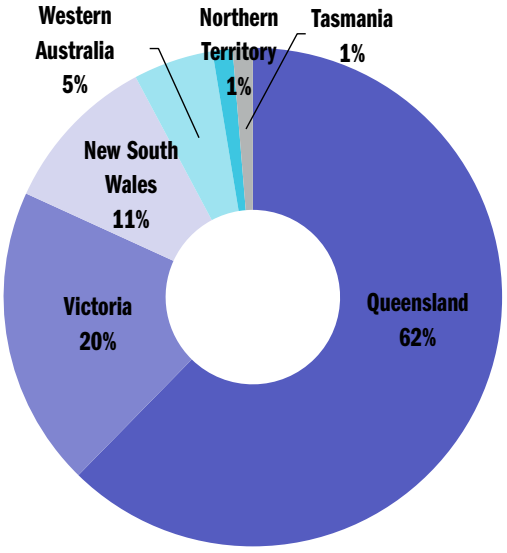


Figure 1. Location

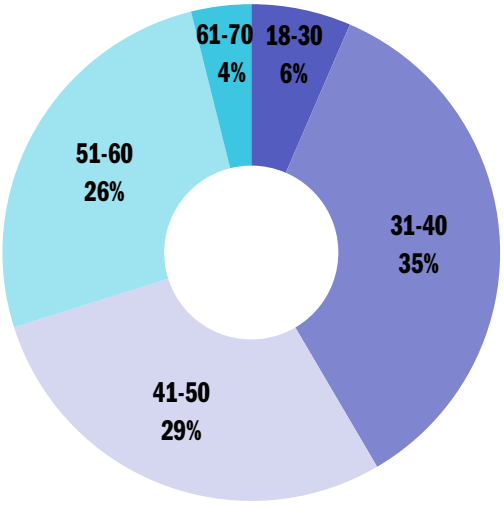


Figure 2. Age

Survey respondents came from all states and territories of Australia, except the Australian Capital Territory and South Australia. The majority were located in Queensland, which reflects both the snowballing sampling method beginning at The University of Queensland, and the strong history of telehealth services for the many remote communities in that state.

The age groups of participants broadly represents the spread of ages across the health workforce, and were mostly female (87 per cent).

Staff roles ranged from nurses to doctors and administrators, and almost half were allied health professionals (Fig. 4.).

These roles were spread across services including medical, rehabilitation, maternal and child health and cancer care. Their workplaces included community health, inpatient and outpatient settings, with the latter representing the majority of participants at 61 per cent (Fig.5).

Participants provided different types of telehealth services, but the majority were direct consultations, assessments or educational support between clinicians and patients over the phone (around 57 per cent) or video conferencing (40 per cent). Remote monitoring and 'store and forward' were used only by a few services (Fig.3).

Three future scenarios

Once we had the data, the Hassell design team explored three potential telehealth scenarios for a hospital outpatient department:

1. Business as usual - 10 per cent telehealth delivery
2. Mixing it up - 50 per cent telehealth delivery
3. Complete transformation - 100 per cent telehealth delivery

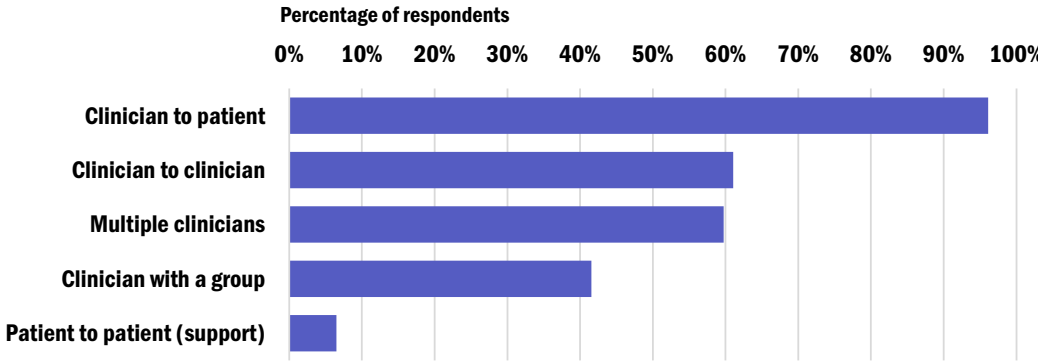


Figure 3. Types of telehealth services delivered in 2020

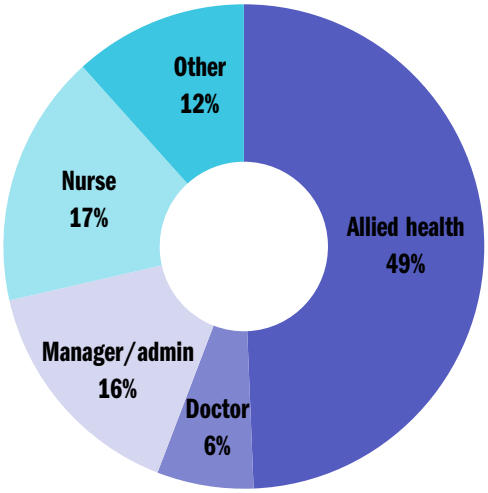


Figure 4. Role

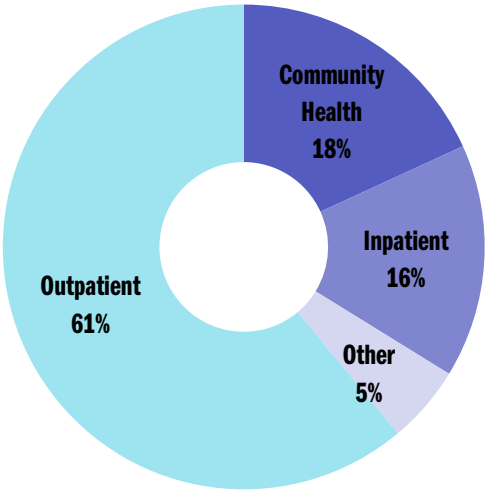


Figure 5. Health setting

WHAT WE FOUND

1. There is no turning back

Our survey respondents expect telehealth to continue at a significantly higher level than before the pandemic.

On average, participants reported that they delivered around 9 per cent of their services by telehealth in 2019, growing to 68 per cent in 2020. They anticipate this to decrease to around 40 per cent of all services in the coming year, which nonetheless represents a staggering four-fold increase on 2019 levels (Fig. 6).

While technology (either confidence with or access to) was easily the most common barrier to telehealth services, the forced uptake through 2020 appears to have generated enough experience and familiarity to ensure ongoing acceptance of technology as a useful tool.

"After the shutdown we went to 100% telehealth and people were relieved."

Several studies indicate positive responses from both patients and clinicians to telehealth during 2020.[6,7,8,9] And some respondents also believe there will be a parallel increase in home-based care, whether at the expense of telehealth or in-person consultations.

What the levels of uptake will actually be in coming years is anyone's guess (and there are plenty of projections), but it's safe to assume the genie is out of the bottle.

"I expect telehealth will undoubtedly increase but I think the major change is a shift away from hospital care, because we can't keep up with demand."

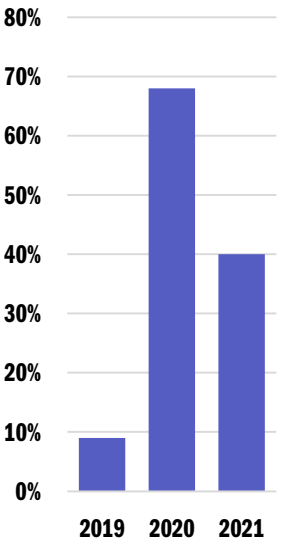


Figure 6. Pre-, during and post-pandemic telehealth services

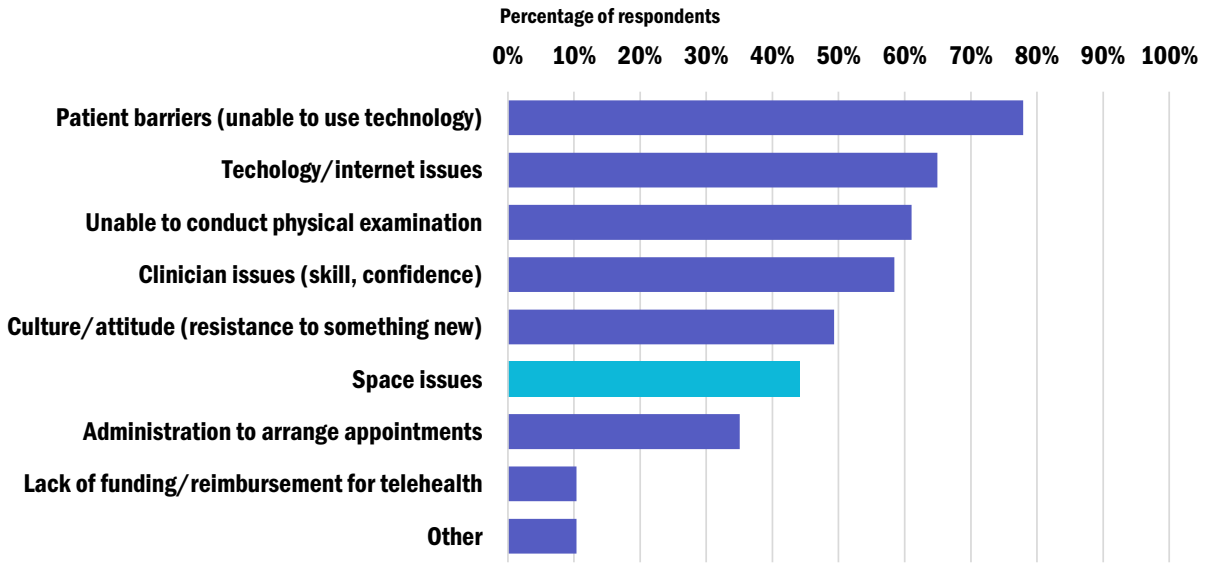


Figure 7. Barriers to staff using telehealth

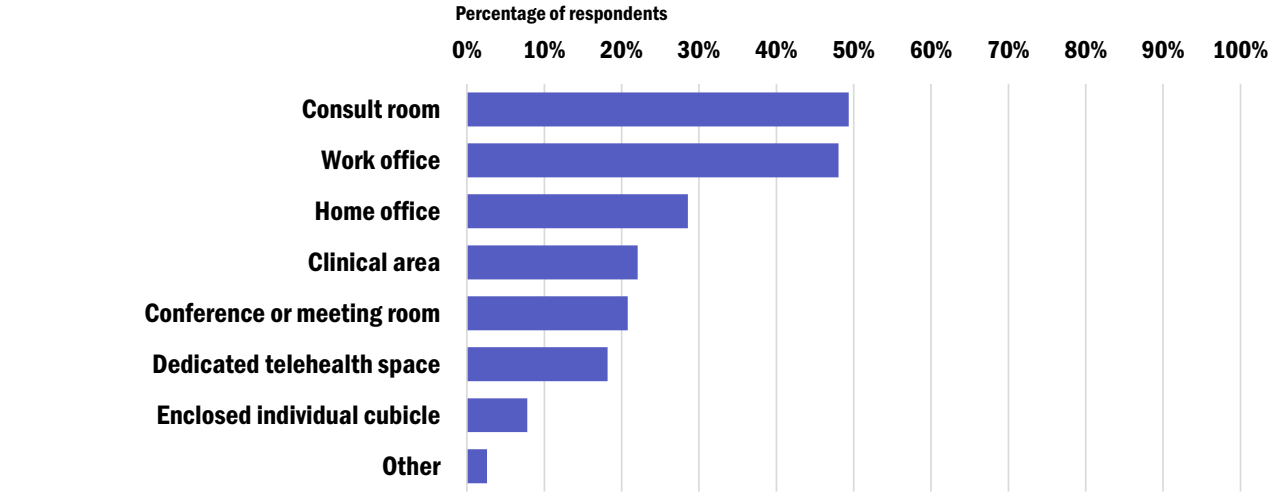


Figure 8. Current spaces used for telehealth (select all that apply)

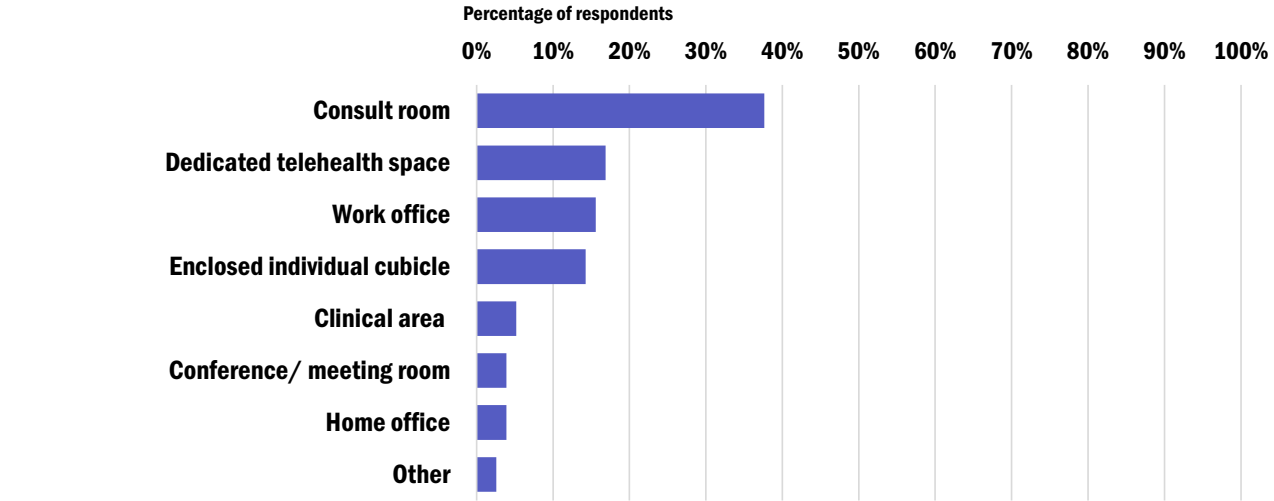


Figure 9. Preferred space for telehealth (select one)

2. We need both modes for now

Survey participants indicated a strong desire to use consultation rooms for telehealth in preference to other spaces. This demonstrates the importance of ensuring facilities are designed to be multi-purpose.

"I'm dealing with lots and lots of different people over the telephone and the occasional person comes into the office, so we need space for that as well."

Expectations of ongoing mixed-mode delivery may explain the strong future preference for consultation rooms over dedicated telehealth spaces, which are much more space efficient, containing only the necessary technology and a desk in most circumstances.

However, this may change as facilities move toward more, or even exclusive, telehealth service offerings.

An interviewee indicated that at least one hospital in Australia is planning for activity-based working, where staff use spaces according to their task, rather than a single space for all tasks.

While this design approach is common in commercial workplaces, it has, up to this point, failed to gain traction in the health sector. Perhaps the pandemic upheaval will be a catalyst for change in health workplace planning.

"Discussions for telehealth specific rooms have been few and far between, but I suspect that will become part of the design for activity-based working – space saving rooms where you can just do telehealth."

3. More and better spaces please!

There is evidence of a lack of dedicated telehealth space in Australian healthcare facilities, and the quality of existing spaces varies substantially.

Figures 8 and 9 indicate that while many staff would prefer to work in consultation rooms, they were in fact using whatever space was available to them. Most respondents used more than one space, depending on the type of work they were doing or the space available to them (Fig.8).

"I'm in a different space every day, so it just depends."

As noted previously, technology (either confidence with or access to) was far and away the most commonly cited barrier to telehealth. But almost half of the survey respondents also indicated inadequate space as a barrier to telehealth (Fig. 7).

While there may be a shortage of space (there's always a shortage of space in hospitals!), what is on offer is not always up to scratch.

The quality of various aspects of the spaces available were rated most commonly as "Fair". Fortunately, a "Very Poor" rating was uncommon (Fig. 8), although notably this applied to aspects of privacy and adequate space.

But "Fair" quality is hardly good enough. The availability and suitability of space undoubtedly affects the quality of telehealth consultations, with inadequate lighting, acoustic treatments and poor confidentiality given as examples that compromise delivery.

Some hospitals had a head start in dealing with the surge in digital health. Organisations that were already providing online services adapted more readily to the change in delivery method.

Participants noted that hospitals generally didn't make changes to their spaces to accommodate increased telehealth, so staff inevitably used whatever spaces were available, including home offices.

Maybe there wasn't time, or space, or funding; probably all three. Another explanation is that knowledge on what to change, and how, was simply not available.

Most survey respondents (85 per cent) indicated no changes were made to their workspace, and those that did made small technology upgrades. When asked about how they could improve the visual and acoustic quality of their spaces, many chose items that would *not* enhance the quality, like having a colourful background, or a window behind them, or polishing surfaces.

This suggests that telehealth facility design guidelines (written by and for individual hospitals, or peak bodies such as the Australian Health Infrastructure Alliance) are necessary to improve knowledge about best-practice design considerations (light, colour, layout, technology, etc.).

"We've put together some standards. When we're doing redevelopments we say to the architect, 'these are the standards that you need to comply with'."

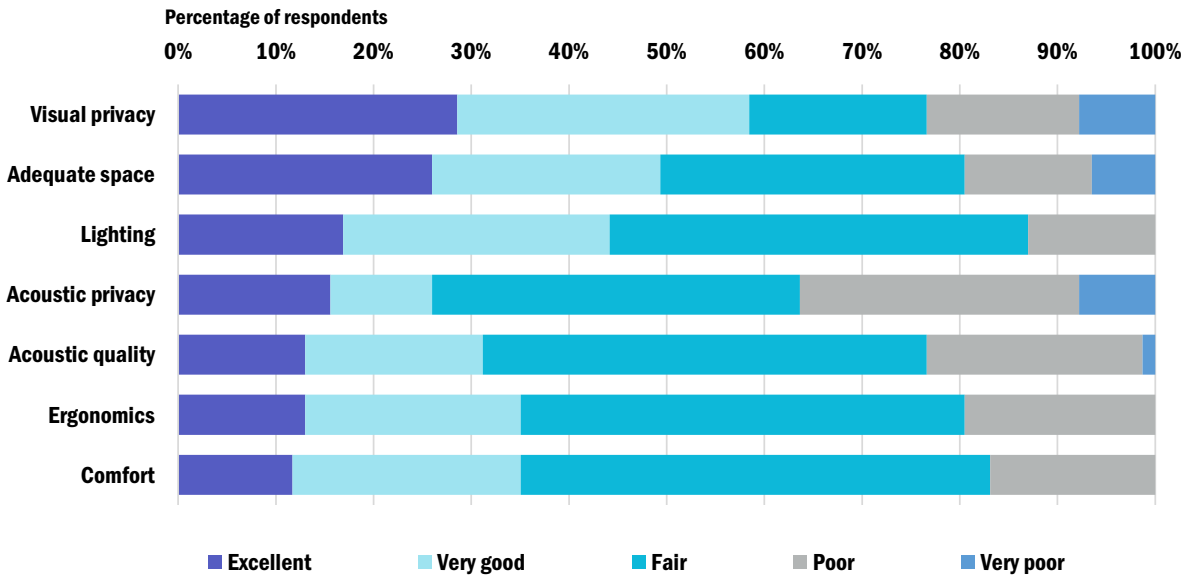


Figure 10. Quality of existing spaces used for telehealth

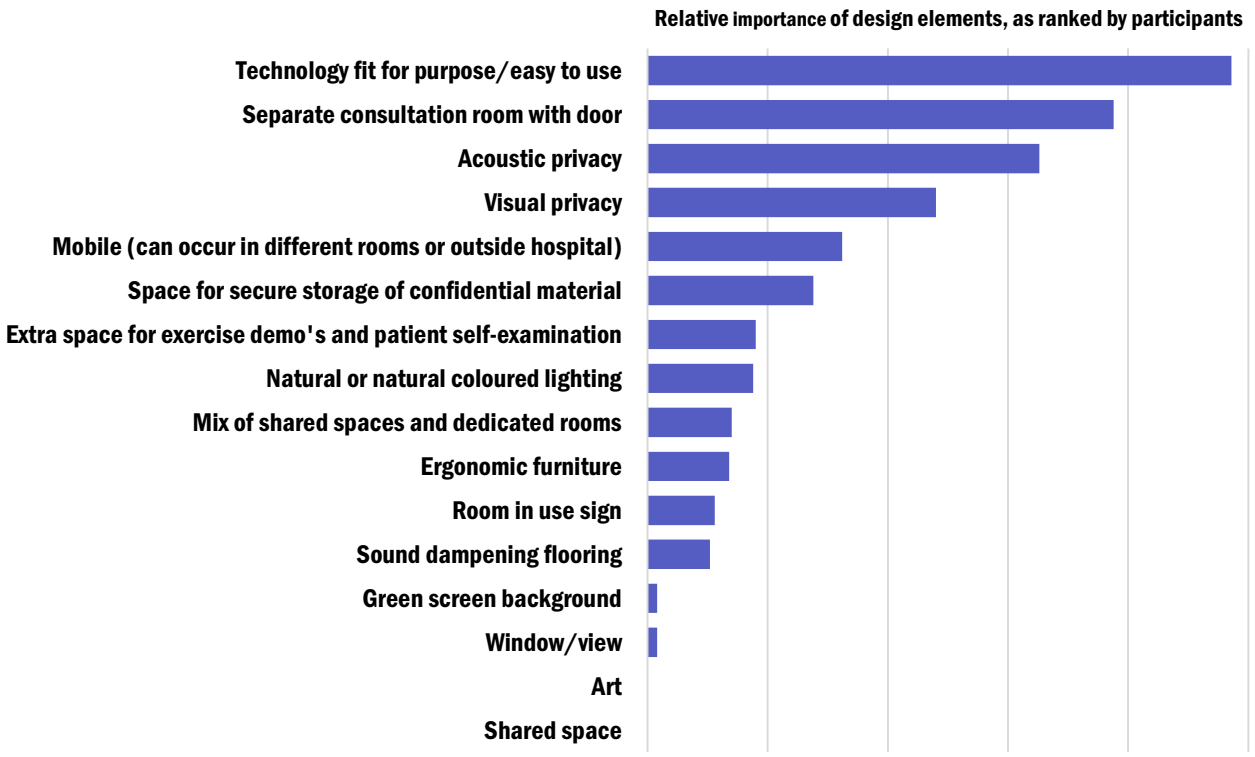


Figure 11. Importance of design elements in a telehealth space

4. It's confidential

In an ideal telehealth setting, visual and acoustic privacy are critical. Privacy (as well as adequate space) elicited the most polarised ratings for current spaces, indicating the importance of these characteristics, and the varying quality across existing facilities.

Consultant rooms were the preferred location for telehealth in the future (38 per cent of all respondents). Dedicated telehealth space (17 per cent) and enclosed offices (16 per cent) were the next most popular.

"The really important thing is that it's a space on my own for privacy because I'm dealing with lots and lots of different people over the telephone, so confidentiality is important."

Shared spaces such as clinical areas (5 per cent) and meeting rooms (4 per cent) were not favoured, with poor acoustics and privacy the likely reasons. Most of the telehealth services were conducted one-to-one, and most participants preferred to work alone in a private room to limit distractions, maintain good acoustic conditions and of course, patient confidentiality.

"I had one patient say to me, 'I'm just not sure if there is someone else in the room?', and I picked up the computer and turned it around to show them that there was no one else in the room."

This highlights the eternal challenge for hospitals seeking to maximise clinical space efficiencies without compromising patient and staff privacy.

The dignity of a single patient bedroom or consultation room is incomparable to the very public experience of a curtained cubicle in an emergency room. While telehealth patients can enjoy the privacy and quiet of their own home on one end, an adequate space at the clinician's end is not guaranteed.

Hospitals must consider the potential erosion of a newly developed patient confidence in telehealth if suitable spaces are not provided to deliver it.

"I think that if (telehealth) rooms are picked up and built appropriately then it will allow a level of confidence for both patient and clinician that they've got privacy... If we get it right, it will create a better experience for all concerned."

5. The wait is over

The pandemic will likely accelerate the recent trend in hospitals to minimise waiting areas for patients.

Many facilities now register patients at reception and then encourage them to wait elsewhere (in a cafe or outside, for example) until they receive a text message to inform them the clinician is ready to see them.

Post-pandemic, with extra incentive to minimise infection risks and an increase in telehealth, hospitals have an opportunity to dedicate less space to public circulation and waiting areas.

Figure 10 shows that waiting, visitor and reception spaces were used significantly less during peak telehealth periods. This was largely due of course, to stay-at-home orders.

Many patients will return to hospitals after the pandemic, but it is likely that virtual and home-based care will become more common for less acute patients or those with chronic disease.

Curiously, Figure 10 also shows more activity in storage areas in some instances. While one respondent did note that telehealth consultations were occurring in a storage cupboard, this finding is somewhat perplexing.

In 2019, a McKinsey survey of US health executives found that one-third of respondents planned to decrease capital investments as a result of the shift to virtual health.[10]

In Victoria, Australia, approximately 6 per cent of all hospital days are already provided in a 'hospital-at-home' setting. Several similar programs in the US have demonstrated savings of 30 per cent or more per admission by providing acute care at home through in-person provider visits.[11]

This opportunity to save money and space is unlikely to be squandered by a sector chronically short on both. It will play out differently across regions and systems, but there are at least three potential consequences:

- → Facilities that maintain both modes of service (virtual and face-to-face) will have fewer patients on site, decreasing the need for public space. Facilities that increase home-based care will also have fewer staff on site.
- → Facilities that move to full telehealth and community-based care will have no patients on site, reducing public space to an absolute minimum.
- → Alternatively, facilities that increase telehealth or home-based services will have more acute in-patient care and less outpatient activity, with a consequent shift in space allocations in clinical areas, but not public areas.

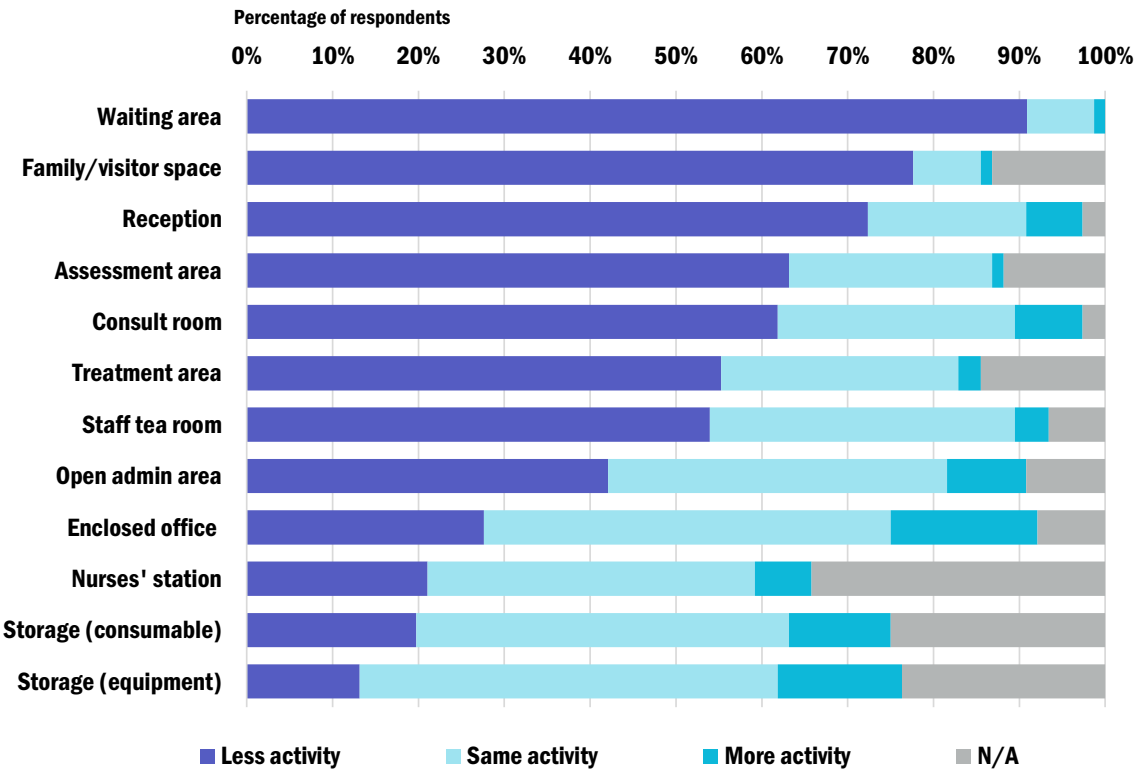
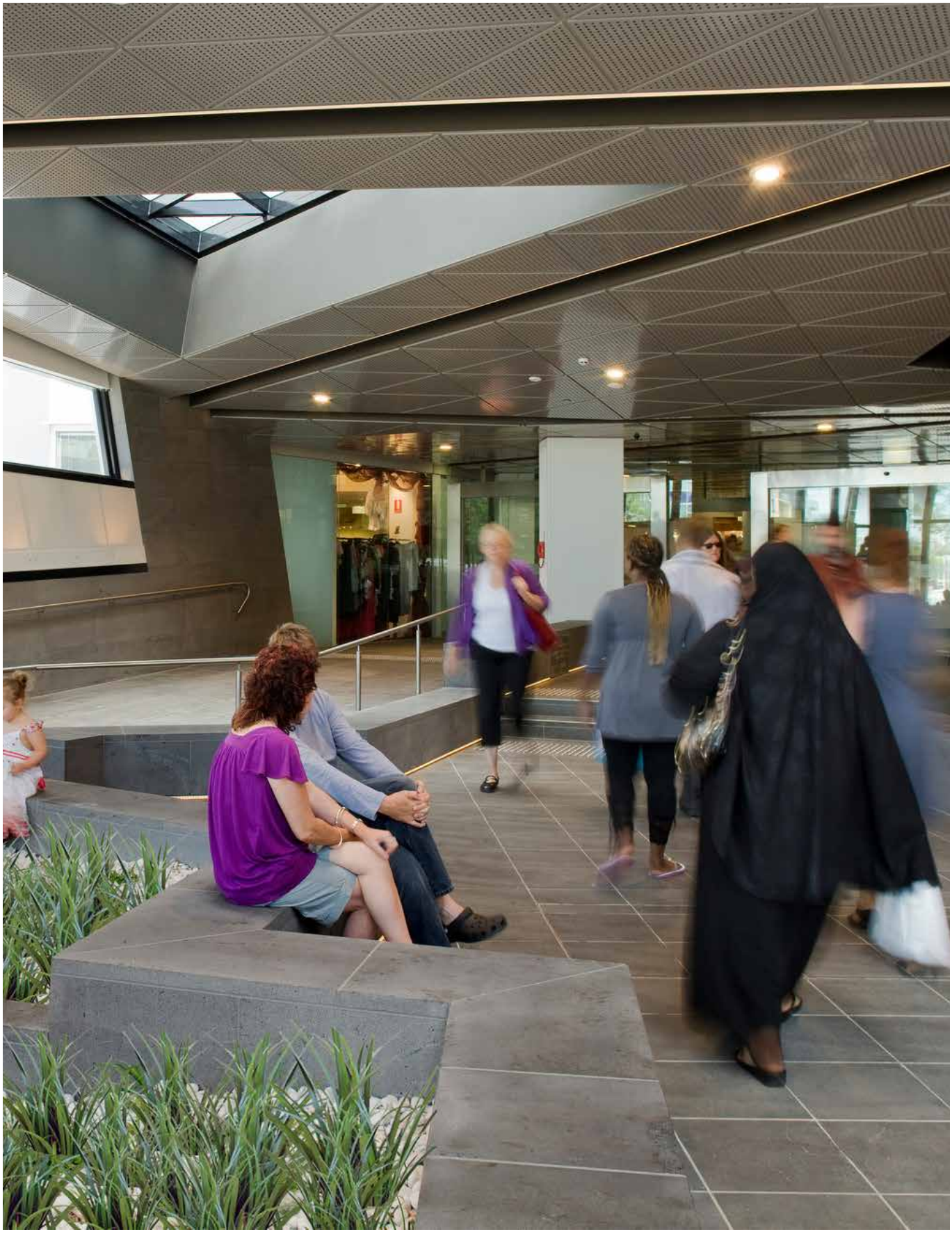
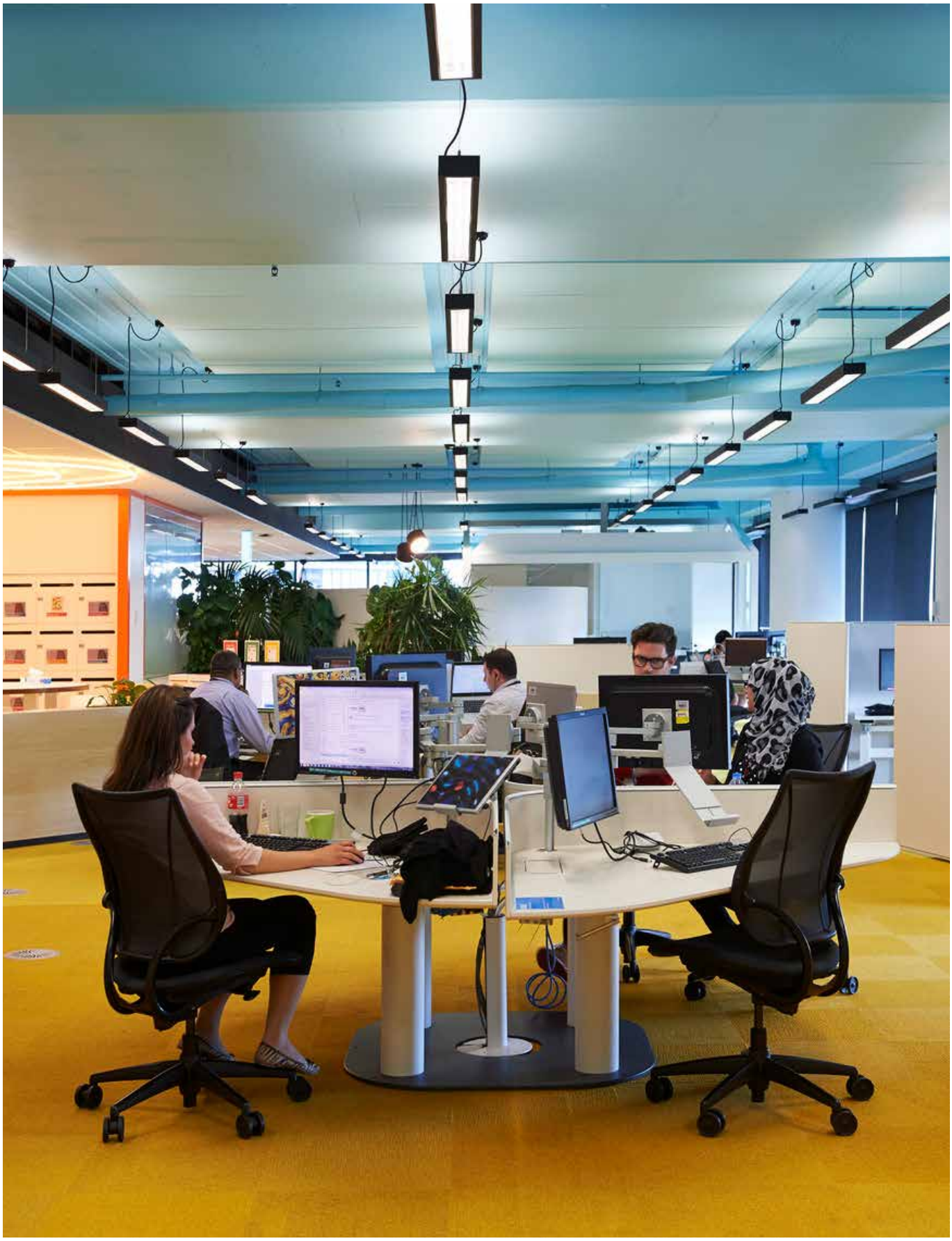


Figure 12. Observed levels of activity in hospital spaces during 2020



Royal Melbourne Hospital Emergency Department,
Melbourne, Australia
Photography by Dianna Snape



Medibank Place, Melbourne, Australia
Photography by Earl Carter

FUTURE TELEHEALTH SCENARIOS

If the uptake in telehealth experienced in 2020 is sustained, as everyone expects it will be, how much current health infrastructure is appropriate for the models of care that are emerging?

Like a lot of research, this project raises more questions than it answers — for designers, but also for health system administrators. We're not just talking about installing a few more computer screens with headsets here. System funding, workforce planning, staff training, and, in some ways the fundamental premise of human-centred care, are now up for debate.

Can an online video call support a strong patient-clinician relationship, or does it remove an essential, personal element of care? Will clinicians be confident that virtual services are effective and meet the patients' clinical needs. And how will health practitioner education need to change?

These are considerable and complex challenges. But our focus is space, because all of that is too big for one small research project!

We surveyed and interviewed a variety of clinicians, across a range of fields of health practice.

But more allied health practitioners took our survey than any other group, so we thought it made sense to explore three potential future telehealth scenarios for an outpatients department, where many allied health services are provided.

1. **Business as usual**
   - → 10 per cent telehealth services
   - → 90 per cent in-person services
2. **Mixing it up**
   - → 50 per cent telehealth services
   - → 50 per cent in-person delivery
3. **Complete transformation**
   - → 100 per cent telehealth services

These scenarios reflect both our respondents' actual levels of telehealth services before and during the pandemic (Business as usual, and Mixing it up), and our projection for what might lie in the future (Going all the way) for some health services.

The floor plans that illustrate the scenarios are intended to prompt discussion about what approach might suit different types of hospitals, with different cohorts of patients and different staff work patterns.

BUSINESS AS USUAL

Mixed-mode delivery
10 per cent telehealth

Old habits die hard. As the pandemic passes, many facilities are likely to revert to delivering most of their services in-person. For our survey respondents, pre-pandemic in-person delivery was around 90 per cent of all consultations.

Patients and clinicians will be eager to re-establish personal connections, and the limitations of existing technology, building infrastructure, funding and staff capabilities will also put the brakes on. Figures 13 and 14 show common planning approaches to outpatient departments. Many hospitals around the world accommodated telehealth services during the pandemic in spaces just like these: meeting rooms, treatment areas, admin offices and ancillary spaces.

Our research indicated that for services already offering regular telehealth, this presented few problems. But for many others, appropriate space was hard to find.

"Space hasn't been an issue. The outpatient dieticians have their own clinical room, so they could easily do video-conferencing."

"There is no physical space left. We just need more rooms, mostly small rooms. We need to hire a demountable."

While business-as-usual spaces have worked as well as could be expected given the unprecedented nature of the crisis, our research clearly indicates that layout changes are both necessary and inevitable for healthcare workers to deliver optimal care for their patients.

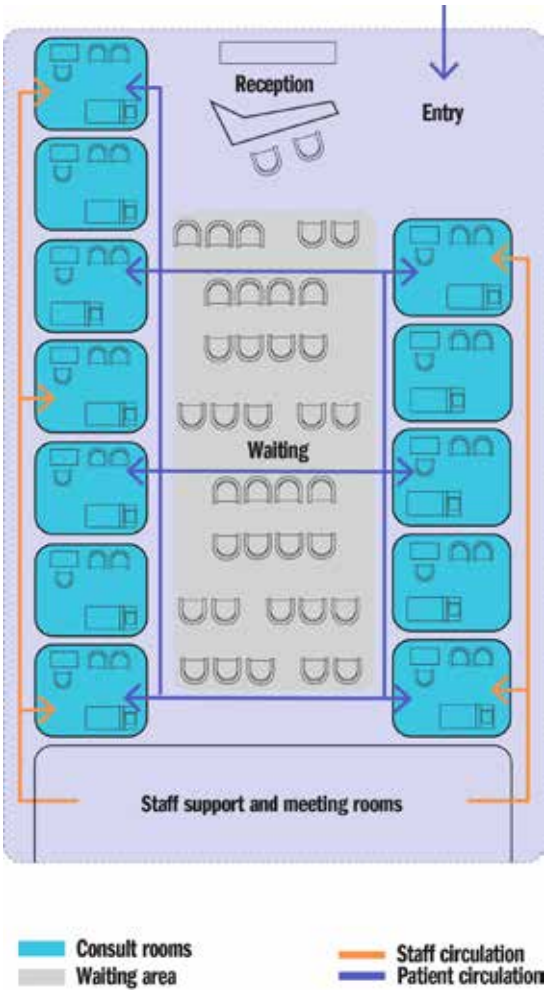


Figure 13. Outpatient department Type A: Business as usual

- → Large internal waiting area
- → 12 in-person consultation rooms
- → 0 telehealth work points
- → Indicative only, not to scale

Figure 13 shows a typical outpatients department layout with a dedicated, large waiting space adjacent to the consultation rooms. A staff-only zone beyond this public area accommodates meeting, administration and ancillary activities.

Staff can circulate behind the consultation rooms to provide some separation, but the spaces are mostly shared by staff, including reception, and patients.

Individual enclosed consultation rooms provide excellent privacy and acoustic separation, but are the least efficient use of space compared to other scenarios.

Patients can readily enquire at reception about any issues (car parking, usually, or how long will this take?). Each room can (theoretically) feature the same layout and equipment available for use.

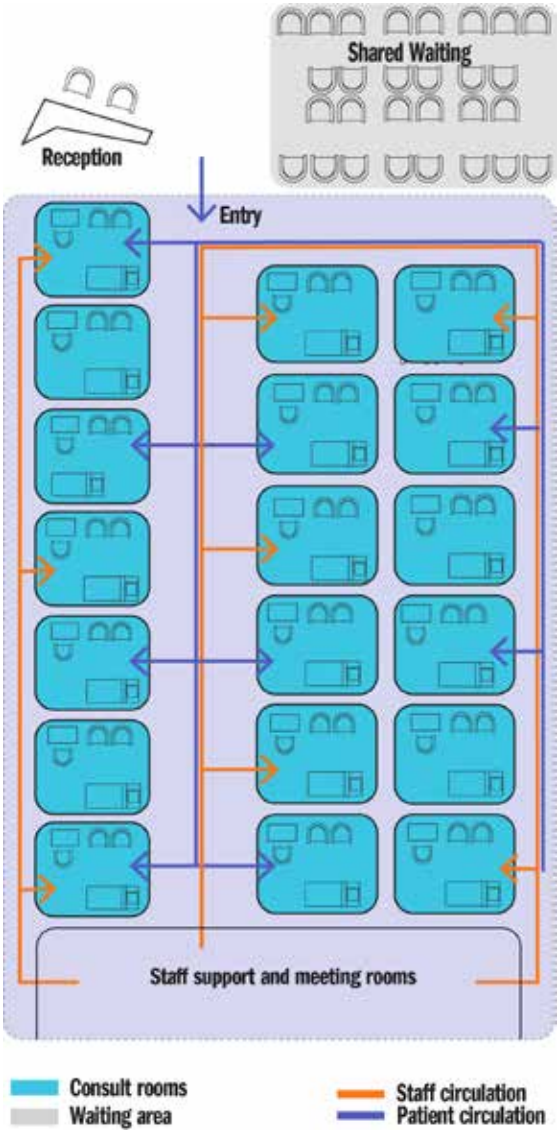


Figure 14. Outpatient department Type B: Business as usual

- → Large waiting area shared with other departments
- → 19 in-person consultation rooms
- → 0 telehealth work points
- → Indicative only, not to scale

Figure 14 is a department with an externalised or separate waiting area, more commonly seen in newer facilities that rely on mobile phone text alert waiting systems.

These waiting areas may be close to the department, or patients may be directed to wait in the hospital cafe or public lounge areas.

This layout removes the reception area from the department, leaving patients to make their own way to consultation rooms, or requiring a clinician to escort them.

Sharing waiting seats with other departments frees up space for more consultation rooms and creates a much more concentrated and quiet environment, but can lead to rabbit-warren spatial solution if the floor plan is deep or poorly lit.

This access all areas approach can result in patients wandering through the space looking for their clinician. Clear signage is crucial.

Clinicians delivering telehealth in these spaces will be taking up space that could otherwise be used for in-person consultations, but this approach can be appropriate if telehealth services are very limited.

MIXING IT UP

Mixed-mode delivery
50 per cent telehealth

As clinicians and administrators examine the successes of telehealth during 2020, it's likely many will look to deliver mixed-mode healthcare on an ongoing basis.

The barriers to telehealth implementation will be addressed gradually, to limit disruption (we've had quite enough of that lately), eventually allowing clinicians to make a permanent change in their models of care.

Our survey respondents expect that, on average, around 40 per cent of their services will be telehealth in the future. We've rounded that up to a neat 50, and based on that assumption, explored what might happen to typical department layouts, through refurbishment or new build.

While there are endless possible approaches, here we show two: Figure 15 illustrates a department divided explicitly into in-person and telehealth-only zones, while Figure 16 combines the two modes in one integrated public zone.

Each has advantages, and the benefits will vary according to patient cohorts, models of care and available space.

"I'm in a different space every day. On a Monday I'm in a consultation room in the endoscopy unit. It's a completely enclosed separate individual consultation room. But on Wednesday I'm in a room that is just separated down the middle by a concertina wall, so it's not exactly soundproof."

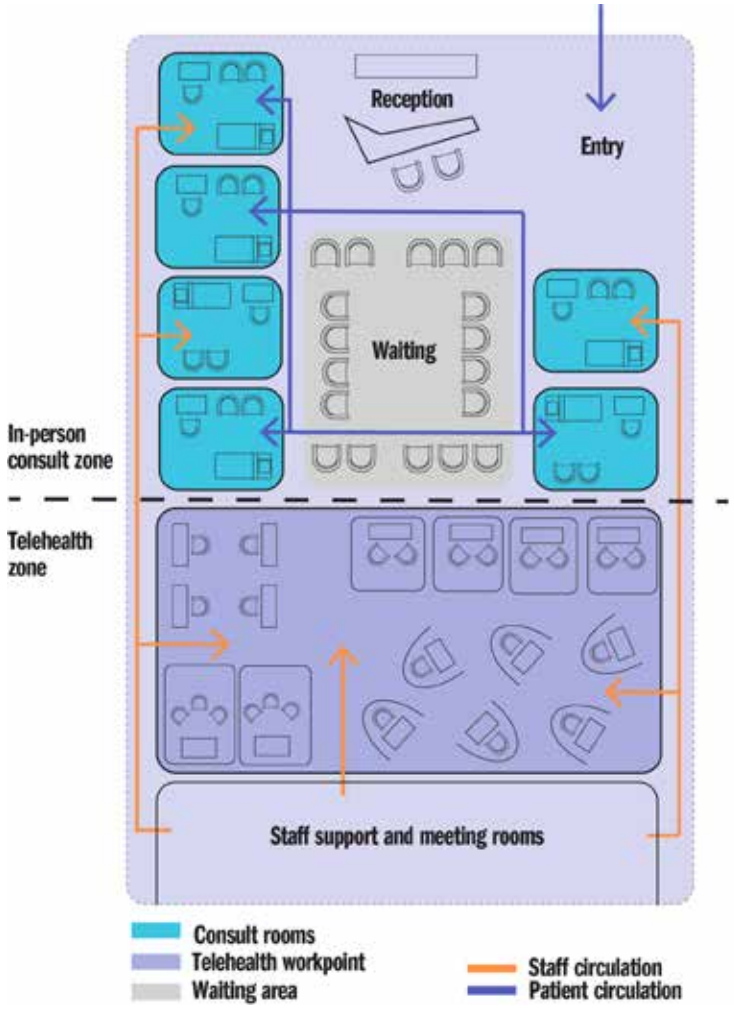


Figure 15. Outpatient department A: Mixed-mode

- → Reduced internal waiting area
- → 6 in-person consultation rooms
- → 16 telehealth work points
- → Indicative only, not to scale

In particular, the range of staff using a facility will influence the type of zoning required. Are clinicians working permanently in one department, or moving daily across locations within or beyond the hospital?

Will virtual consultations be delivered in blocks of time, or sporadically across the day? Will some staff continue to deliver in-person consultations only?

In Figure 15 we have replaced half the consultation rooms with a staff-only telehealth zone. This includes work points for individual and group consultations. Some are enclosed, while others are more open but protected by privacy screens.

This setup increases the number of consultation work points in the department to 22 compared to just 12 in the Type A Business as usual layout in Figure 13. It also gives clinicians a range of work settings to choose from.

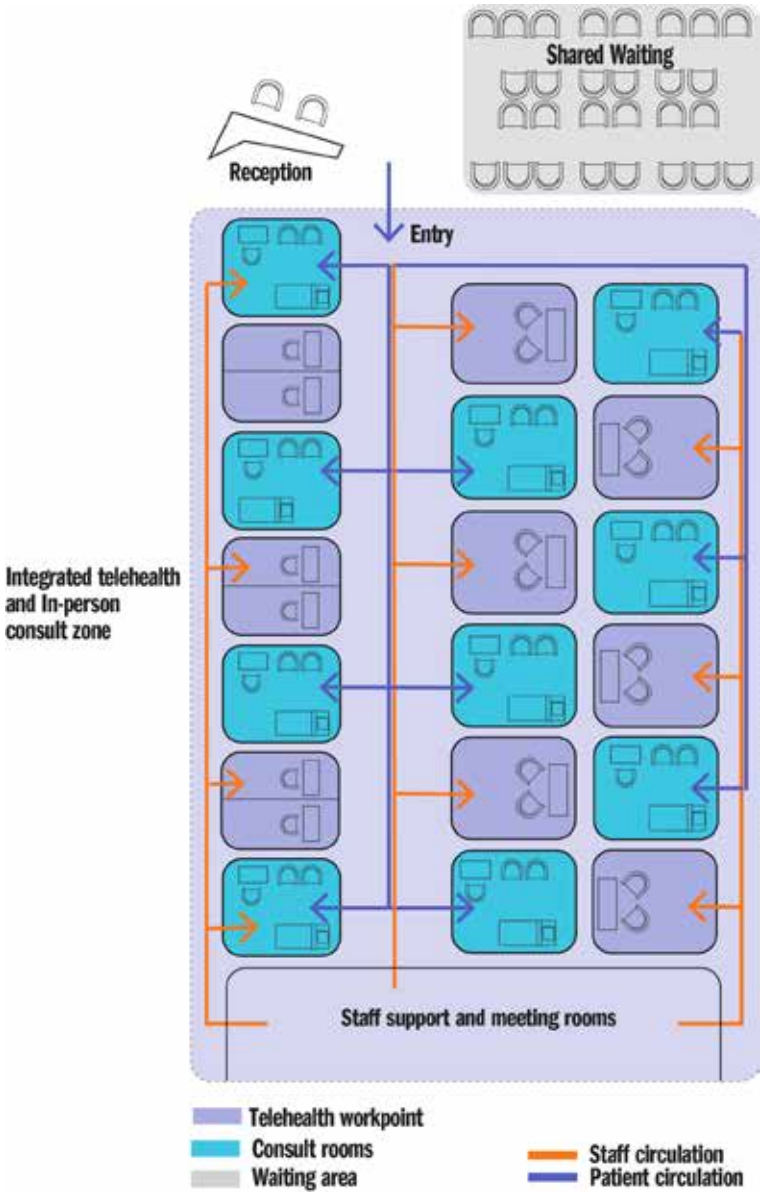


Figure 16. Outpatient department B: Mixed-mode

- → Waiting area shared with other departments
- → 10 in-person consultation rooms
- → 12 telehealth work points
- → Indicative only, not to scale

The shift in work practices to more telehealth means spaces previously dedicated to in-person consultations and public waiting areas will likely be given over to, or shared with, telehealth.

In Figure 16, the externalised waiting space is shared with other areas of the hospital, allowing significantly more private, enclosed consultation space, both in-person and telehealth, than in Figure 15.

In addition to this space saving we have replaced half the consultation rooms from Business as usual Type B (Figure 14) with telehealth rooms.

Some of these are small booths that hold one person only, while others are larger to hold two clinicians, or to allow for exercise demonstrations or equipment.

"If you are doing a physiotherapy assessment and you want to watch someone walk, you have to have a decent amount of space to demonstrate walking. So it might be that the gym is set up for some telehealth appointments."

The integration of in-person and telehealth spaces allows quick and easy access for clinicians to swap between the two delivery modes throughout the day.

Some facilities may refurbish spaces to provide telehealth-only booths or cubicles that are more space efficient than in-person consultation rooms with beds, handbasins and other equipment.

Those refurbishments may be as simple as dividing consultation rooms into two smaller spaces, or changing the furniture in consultation rooms to enable multi-disciplinary clinician teams for online consultations.

Or, the changes may be more wholesale, converting an entire section of a department to telehealth rooms or work points only, as shown in Figure 15.

"It would be great if we had a dedicated telehealth space that had soundproofing and was quieter, and it was just the telehealth room so if a doctor was going to set out to do a list of tele patients – like maybe six or ten – and just go one after another."

As the pandemic subsides, myriad variations on these mixed-mode approaches will appear in hospitals, and each will be developed to suit the unique staff, patients and models of care of each.

COMPLETE TRANSFORMATION

100 per cent telehealth

Some healthcare systems have already taken the next step: whole buildings dedicated to telehealth delivery, otherwise known as 'the hospital without patients'.

Virtual Care Mercy Hospital in Missouri, US, was designed by Forum Architects to accommodate over 300 virtual care staff in mostly open plan space. The staff monitor and consult with patients who are at home or in hospitals around the state.[12]

Similarly, although smaller in scale, RPA Virtual in Sydney, Australia is a hub within a major hospital delivering digital health services to patients in their homes. This facility was set up pre-pandemic for cystic fibrosis and palliative care but quickly pivoted to non-critical COVID-19 patients soon after opening.[13]

This emerging model of care paves the way for a different approach to hospital workplaces, re-imagining them as offices, rather than clinical environments.

A hospital is not an office of course, and clinicians may be as reluctant, if not more, to give up their traditional work settings, as many commercial workers have been in recent years.[14] The findings of this research certainly support that. Clinicians indicated a strong preference for enclosed workspaces over open areas because of concerns about confidentiality and distractions.

And they have a point – no-one wants to compromise patient confidentiality. But more open workspace doesn't necessarily mean the dreaded call-centre design.

The most likely 'office' approach may be a standard layout of enclosed telehealth rooms with some open space for administration (Figure 15).

Or, as our survey indicated is already happening in some locations, it may be activity-based working, where staff use different task-appropriate settings throughout the day, rather than an allocated desk or office.

"We are designing part of the new hospital to have activity-based-working. There'll be areas where you go to for the type of work you're doing, rather than areas that you sit in irrespective of what you're doing."

Many clinicians work in different locations over the course of a week. When staff and tasks change on a daily basis, the hospital workplace can be designed to be more flexible.

Tailored work settings for telehealth, consultations, education, research, and administration within the one workplace can increase efficiencies (no more empty offices on the doctor's day off) and quality care (no more telehealth in a cupboard).

Concerns for patient privacy in a more open and flexible workplace can be addressed through thoughtful design solutions (privacy screens, semi-enclosed work pods, quiet zones and acoustic treatments).

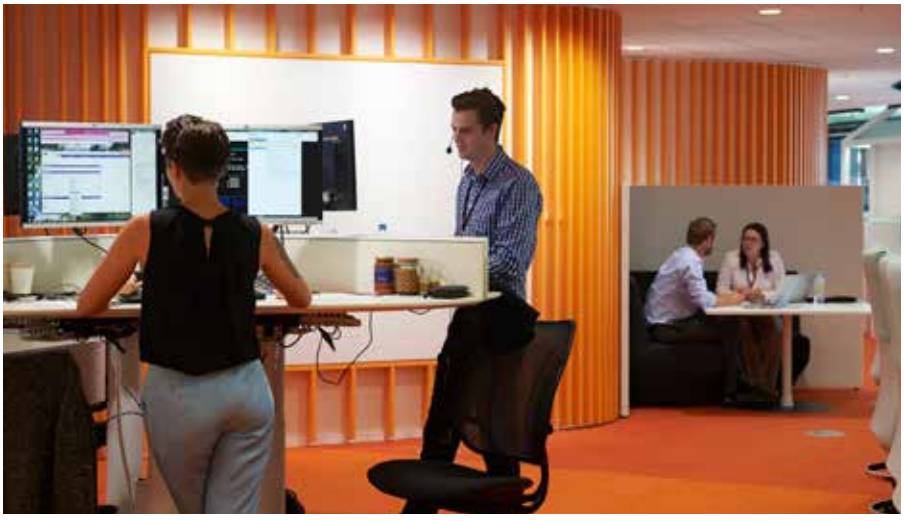
And positive experiences from 2020 will also feed a greater willingness to innovate.

"Currently at the hospital we've got offices and the clinicians have an office in which they see clients or do their telehealth. That won't be the case in the new hospital."

Telehealth-only buildings or spaces won't work in all circumstances, and possibly not even in the majority. But the potential for some patient cohorts (cardio, stroke, psychiatric and allied health conditions) to be safely cared for virtually has been demonstrated unequivocally in 2020.

And, having said all that, if beaming in to a health appointment from home is right for some patients, it may also be right for some staff.

Many on-call and 24/7 health services already work this way, but almost one-third of our survey respondents worked at least some of the time from home during the pandemic.



Medibank Place, Melbourne, Australia
Photography by Earl Carter

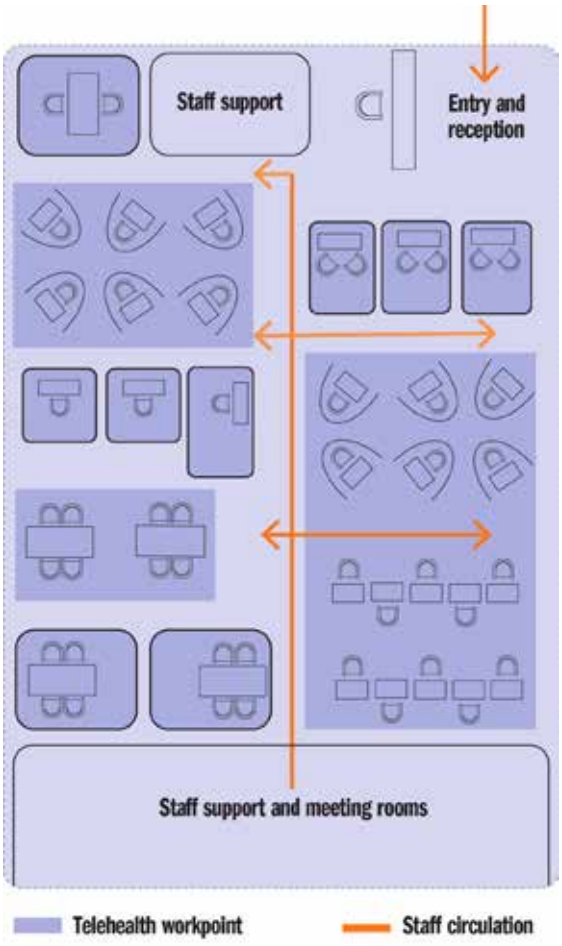


Figure 17. Outpatient department C: Activity-based working

- → No waiting area
- → 0 in-person consultation rooms
- → 33 telehealth work points
- → Indicative only, not to scale

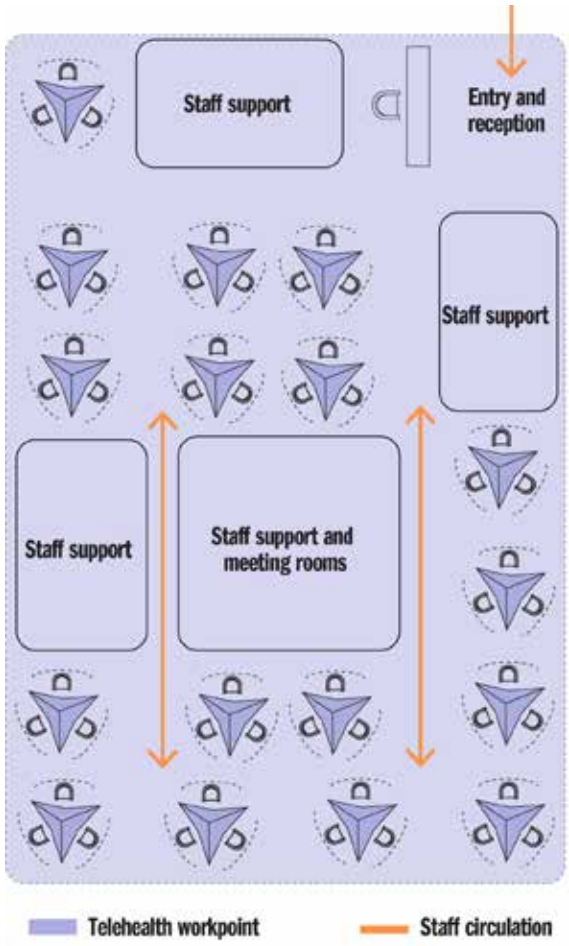


Figure 18. Outpatient department C: Full telehealth

- → No waiting area
- → 0 in-person consultation rooms
- → 51 telehealth work points
- → Indicative only, not to scale

Across many sectors, COVID-19 has taught us that working from home can be productive, efficient and in some cases, preferable.

If clinicians that have the appropriate technology and space at home can deliver safe, confidential and human-centred care, we may not even need large virtual hospitals.

The activity-based working model of Figure 17 is a significant departure from the previous scenarios. It shows only a staff space, with a variety of telehealth and other work settings in open and enclosed spaces.

Different sized rooms allow clinicians to find the most suitable space to accommodate groups or equipment.

The various individual settings (semi-enclosed work pods, open desks, enclosed rooms) provide choice of work points, and create zones that can be designated 'quiet' or more collaborative.

A reception may still be required to direct visiting clinicians or administrators, but no waiting space is required because any visitors to the space can be directed to multi-purpose lounge or meeting areas.

Figure 18 shows a full telehealth facility modelled on the open plan spaces at Virtual Care Mercy Hospital in Missouri. It represents the most radical departure from Business as usual department planning.

In the same amount of space that holds just 12 enclosed consultation rooms (Figure 13) this department contains 51 telehealth work points.

Each has a privacy screen behind and in front of the clinician to reassure patients they cannot be seen by others. Head sets block out the noise of other telehealth consultants, and support spaces break the space into separate work zones.

As health systems shift gradually to more home-based care, this approach may not be as radical as it looks.

CONCLUSION

The sudden and exponential uptake of telehealth during the COVID-19 pandemic shattered many perceived barriers to digital healthcare, but exposed a lack of appropriate space in hospitals to deliver it.

Our research explores the potential spatial implications of increased telehealth services in hospitals, from business as usual to a radical rethink of the hospital as an office. As services change, valuable space currently used for waiting rooms and low-acuity consultations can now be reconsidered for other uses, including telehealth.

Hospital planning is, like so many things after the pandemic, at an inflection point. Much change lies ahead. With limited built examples to draw on, hospital planners urgently need guidelines for optimal telehealth space allocations and design characteristics to ensure the ongoing design of fit-for-purpose facilities.

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