HOT HOSPITAL CARPARKS – AN AVOIDABLE RISK FOR PATIENTS, STAFF AND VISITORS?

PROJECT SUMMARY

Through extensive temperature and micro-meteorological measurements at different carpark types across a hospital in Sydney (Liverpool) and an in-depth analysis of relevant standards and guidelines, this project provides an important evidence base for planners and facility operators on exposure to heat. Results of the work will inform important design processes on how existing, unshaded carparks may be upgraded and inform the design of heat-smart new facilities.

The problem

Extreme heat conditions are becoming more commonplace, and they can affect individuals in a range of different settings. Hospital carparks, used by patients, staff and visitors, are no exceptions.

While an important infrastructure, unshaded carparks can pose an unexpected risk to humans by exposing them to intense local heat. This is especially the case when materials used, and the amount of shading available, affect the level of reflection, absorption, storage and radiation of solar energy that impact microclimate and human thermal comfort.

For example, the feels-like temperature 1m above an unshaded asphalt carpark during summer can exceed 60°C. This can pose a significant health risk to carpark users.

Our research

We continuously recorded air temperatures at five different carpark types and conducted spot measurements of air and surface temperatures in sunlit and shaded locations using globe thermometers and other micrometeorological tools (see image).

The measurements were collected under different summer conditions during January-March 2021:

- Normal (maximum air temperature 26-30°C)
- Hot (maximum air temperature 35-38°C)
- Extreme heat (maximum air temperature >40°C)

These measurements were used to document variation of microclimates among the different carpark types and quantify the apparent heat exposure of the human body throughout asphalt, brick and concrete car parking facilities of Liverpool Hospital ins South-

West Sydney. The incident solar radiation reflection ratio (albedo) of these carparks was also measured. Asphalt pavements, for instant, absorb 90% of incoming solar radiation, then released as heat by convection.

Standards, policies and guidelines related to design and safety of carparks were also analysed to identify the role of shade and human thermal comfort.

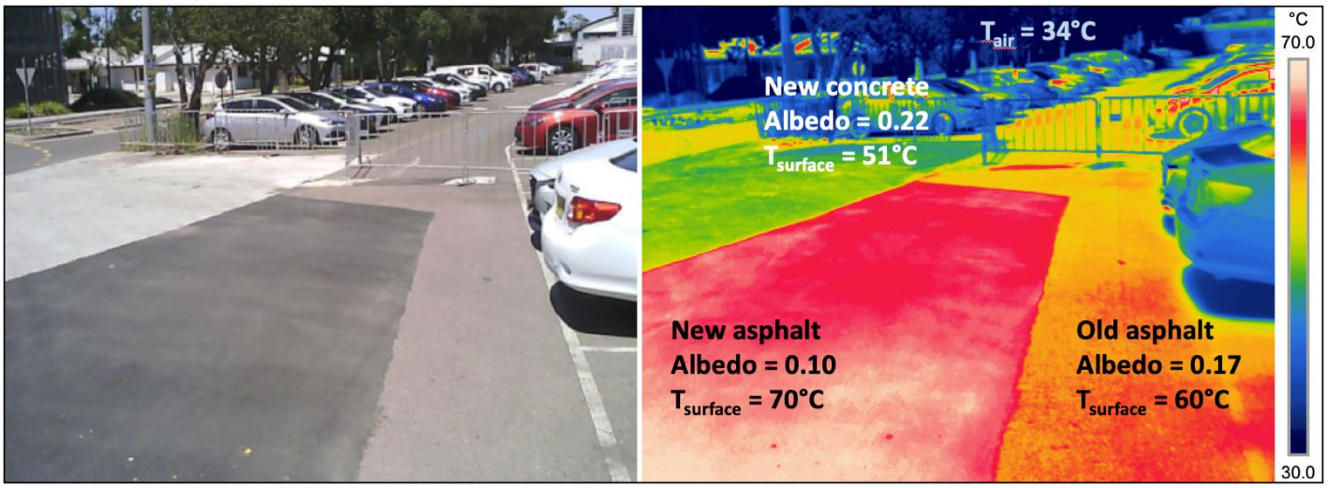
Recommendations

Based on the results of our research, the following recommendations are made:

1. Avoid building at-grade carparks from asphalt if shade is not provided
2. Light-coloured concrete carparks offer thermal advantages
3. Avoid mulch and exposed soil – these surfaces add to heat loads
4. Provide vegetation cover on ground and as shade infrastructure inside and outside of carparks
5. Introduce artificial shade where natural shade is absent
6. Develop thermally smart guidelines and standards for carpark design
7. Educate carpark users about the impacts of hot surface temperatures

Translational impacts targeting health practices and policies

This project has highlighted the issue of heat risks around healthcare facilities. The findings have informed climate change discussions at the South Western Sydney Local Health District and highlighted the importance of shade and the broader impacts of climate change around hospital facilities and their users. At the Liverpool Hospital, our work is informing decisions on surface types as part of the hospital's Landscape Plan for Redevelopment. Our findings have



also been successfully used to support an application for shade sails in the hospital's childcare facility.

Next steps should include:

- Broadcasting information around best practice on sustainable carpark design that reduces the impacts of heat
- Conducting comparative cost-benefit analysis of different sustainability options that account for short and long-term financial, environmental, social and health considerations
- Carrying out comprehensive and systematic audits of heat and thermal comfort levels of all carpark facilities to prioritise cooling interventions
- Conducting in-depth analysis on regulations for introducing or incentivising sustainability upgrades

Future agenda

This project demonstrates the need for change of current policies, guidelines and standards around the design, construction and retrofitting of carparking infrastructure at health facilities and elsewhere to mitigate the health risks associated with unshaded surfaces and during increasingly hot summers.

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- South Western Sydney Local Health District
- University of New South Wales

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The Healthy Urban Environments (HUE) Collaboratory

The HUE Collaboratory exists to improve the health of Australians living in urban environments

We achieve this by facilitating partnerships between those who shape and have an impact on cities.

These partnerships undertake research and activities to build our understanding of how urban environments can deliver better, more equitable health outcomes.

We'll use this understanding to inform government policy and practice in the planning and development of urban areas.