TECHNICAL PAPER

OPERATION PARKING: MANAGING HOSPITAL PARKING DEMAND WITHOUT A CEMENT TRANSFUSION

Author and Presenter

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ABSTRACT

Hospitals can have challenging and unique travel demand pressures. This paper explores how hospital activities affect parking demand in hospital precincts and how parking can be managed in a way that promotes economically and environmentally sustainable travel without adversely affecting the local community.

Parking is reviewed in terms of its role in making connected multi-modal transportation systems. This is achieved through examination of a case study area from a demand-side, integrated transportation perspective. The subject area, Westmead, is Sydney's major health service centre in the Western Sydney Region. Analysis of parking demand focuses on: supply, demand, current parking management practices, and the surrounding transportation network. Parking quantity and restrictions are reviewed, surveys of parking utilisation are undertaken, and other information is obtained through stakeholder engagement. This analysis is informed by a review of literature.

The case study reveals that parking supply is under significant pressure in Westmead. Modal share analysis suggests that a number of strategic parking management initiatives may be effective in managing parking demand in the area from an integrated approach with travel modes other than the single-occupant private car. Recommendations are provided including strategically managing parking through plans, pricing, other restrictions, supporting public transport, and technological mechanisms.

INTRODUCTION

This paper explores how hospital activities affect parking demand in hospital precincts and how parking can be managed in a way that promotes economically and environmentally sustainable travel without adversely affecting the local community.

The Hospital Environment

Hospitals can have challenging and unique travel demand pressures. The hospital environment is often campus-like in nature, with a number of large, interconnected buildings located in close proximity to one another. Often there is limited public automobile access within the cluster, making the geographic set up more 'campus-like'.

Often complementary land uses develop in hospital areas. In evaluating the effects of an activity on the surrounding transportation network, all too often the wider context is overlooked. This includes both how the subject activity's transport demands will interact with surrounding activities and also if it might generate a demand for sorts of activities. For example, in the case of hospitals, there may be an increased generation to non-obvious destinations such as flower shops, pharmacies and even churches. Likewise there may be interest in establishing such activities near to a hospital. It is important to note that land tends to be highly valuable in and around hospital environments due to many competing demands including transport infrastructure provision, commercial and retail establishments, interest in tertiary facilities adjoining hospital campuses (for medical school purposes), and housing.

The hospital itself will attract a range of travel demands. Hospitals employ a large quantity of people, many of whom work non-traditional work hours. Patients and visitors are another major source of travel demand. A number of service deliveries are also associated along with other complementary travel demand generators. Not all of these population segments will be able to drive to a hospital precinct (as is the case and often overlooked transportation networks). Some patients or visitors may be in conditions which do not permit them to drive. For example, some may have poor vision (particularly in the elderly), may be disabled, or too young to drive. Some employees, particularly cleaning staff and other service workers, may not be able to afford to drive, particularly given the general trend of rising fuel prices. Other visitors may simply not want to drive to and from hospitals; particularly staff working long and stressful shifts, grievous families and people wishing to save money or practice more environmentally conscientious behaviour. Employees may work unusual hours, such as night shifts, which can interfere with the viability of travelling by modes other than car.

THE ROLE OF PARKING IN ESTABLISHING MULTI-MODAL TRANSPORTATION SYSTEMS

Parking is often overlooked in its role in driving travel behaviour. This subject could occupy a number of conference papers and has been documented by a number of authors (Shoup, 2005; Seibert, 2008; Genter et al 2008; etc.). Parking is possibly the most influential and easily manipulated tool for managing travel demand. It is becoming increasingly recognised that excessive automobile dependency reduces economic development (Litman and Laube, 2002). This is because beyond an optimal level, excessive per-capita vehicle travel reduces economic development and employment by increasing congestion and overhead costs. Managing travel demand (Travel Demand Management or TDM) supports development by encouraging more efficient resource use. TDM programmes are associated with decreased accident rates, improved mobility for non-drivers, weight loss, community development, and decreases in public costs (M'Gonigle and Starke, 2006; Taylor and Ampt, 2003). The most effective travel demand management (TDM) programmes are comprised from a combination

of coercive and non-coercive measures (Litman, 1999). This combination serves to raise the cost of operating single occupant vehicles while providing a practical alternative.

Eliminating minimum parking requirements and free parking can substantially reduce the cost of urban development, improve urban design, reduce automobile dependency and restrain urban sprawl (Shoup 1997, as cited in Balsas, 2003).

Reform of parking management offers a significant opportunity to achieve many of the goals of local authorities at low cost. Litman (2006) proposes to guide the development and application of parking strategies:

- Consumer choice
- Pricing
- Prioritisation
- Sharing
- Efficient utilisation
- User information
- Flexibility
- Peak demand management
- Emphasis on quality
- Comprehensive analysis

Strategies to strategically manage parking and achieve these objectives are described in Table 1-1.

Table 1-1: Parking Management Strategies (primarily sourced from Genter et al 2008 but supplemented by other authors as identified)

Strategy	How the strategy works, Advantages & Disadvantages
Removal of Minimum Parking Requirements	Minimum parking requirements have been removed from district plans throughout Europe as a myriad of research is unveiling the detrimental effect that they have on urban form and communities (over-abundant parking supplies, sprawling development, inflated land values etc.). Removing minimum parking requirements allows developers the freedom to determine the marginal value of providing car-parks. In this way, the market is allowed to price out unnecessary demand and/or supply in favour of more efficient land uses. Removing parking requirements is expected to result in: • The development of land into more productive activities, resulting in higher densities; • The adaptive reuse of older buildings, particularly in town centres; and • Mode shift. Without an abundant supply of free parking at destinations, travel by other modes will be seriously considered.
Shared Parking	Shared parking is a management strategy that seeks to ensure that parking resources are, where possible, accessible to a range of users. Catering for peak demand in a shared way allows for more efficient parking utilisation than can usually be achieved by parking provision by individual sites. Shared parking can be implemented in two ways: • Regulated through Plans; or • Allowing a market for parking resources to emerge that encourages shared parking in order to realise financial savings.

Strategy	How the strategy works, Advantages & Disadvantages
	Local authorities can assist with this process through education and non-coercive incentives. In hospital precincts there may be opportunities for homes with car commuters to rent out spaces during the day to people commuting to the hospital.
Unbundled Parking	Unbundled parking refers to the strategy of separating the costs of purchasing or leasing residential and commercial property from parking resources. Unbundled car-parks associated with residential development in many urban areas cost an additional $50,000. Costs of this magnitude account for between 20-25% of the total purchase price of smaller dwellings. In the case of hospital precincts, it would be ideal to unbundle parking spaces costs in rents for businesses and residents. Parking should be unbundled for all staff at hospitals (creating an awareness of the cost of parking, instead of masking the cost for some employees in their salary). Given the opportunity to commute and make an additional $3000 (approximate, of course), many employees may opt for the latter.
Flexible parking permits	Flexible parking permits can assist staff who opt to give up an on-site carpark. These cater for employees who need to drive occasionally. So, for example, there may be a shared lot for those with flexible parking permits so that they can drive in on days when they may need a car on the way to/from work. This will serve to provide the comfort of a guaranteed parking space when it is really needed (high valued). So, for example, a staff member may choose not to have a permanent parking space (and receive increased pay), but may then chose to purchase a flexible parking permit for, say, $60 a year which will allow them to drive 10 days a year. Because the shared flexible parking permit lot would be shared, they could then book parking spots in the designated area through a computer booking system. Any spaces that go un-used on any given day could be used for paid visitor parking (if that arrangement suits the hospital).
Directional Signs	Directional signs provide real time information on the location and availability of parking resources. These signs should be placed on key access roads and inform drivers of the locations, availability, and potentially the price and maximum duration of stay associated with off-street parking facilities. This information allows drivers to, firstly, identify the nearest available parking facilities and, secondly, evaluate the relative value associated with different parking areas. This is important to maintaining drivers' sense of autonomy in areas with increasing parking regulation.
Community Transport Management Associations	Joint planning is strongly emphasised by numerous TDM specialists, and can take the form of Transport Management Associations (TMA) which are formed to jointly manage the provision of transport within a particular geographical area (Ferguson, 2000, cited in Senft, 2005; Black 2001). Joint planning allows different stakeholders to consider how to strategically manage travel for an area, and working together will be more successful. For example, joint planning enables shared parking schemes or identification and fulfilment of key transport developments (e.g. a bus stop in a certain location). Generally, the following constituencies should be included in the joint planning process: private sector developers, landowners, employers or business associations, public bodies, government agencies, and in many hospital precincts, students and hospital representatives.

Strategy	How the strategy works, Advantages & Disadvantages
	Possible functions of TMA may include: ▪ Parking brokerage services. ▪ Input into the allocation of parking revenues ▪ Overseeing the management and implementation of travel plans
Car-share Organisations	Car-share organisations are based around the management of a pool of vehicles parked at numerous locations around a community. According to Litman (2006), shared cars typically replace the demand for parking; each carshare vehicle typically substitutes for 5 person vehicles, reducing the demand for 4 parking spaces (Litman, 2006). Members of the organisation are able to book vehicles online and then gain access to the vehicles via electronic swipe cards. One car-share vehicle is typically utilised by a large number of people, thereby distributing the costs of car-ownership, such as maintenance and parking, across a larger number of people. Numerous studies have indicated that members of car-sharing organisations have more sustainable travel patterns, with higher reliance on walking, cycling, and PT. As discussed above, residential use of vehicles is typically reduced to off-peak trips, such as grocery shopping and recreational visits. The emergence of commercial car-sharing organisations is thus considered one means to manage travel demand, thus avoid expansion of parking supply.
Travel Plans	Travel plans are a management tool designed to improve staff travel options and reduce inefficient travel associated with both home-to-work and work-based travel. Travel plans typically audit home-to-work and work based travel demands, and recommend ongoing management strategies to reduce demand for private vehicle travel. Travel plans thus support other parking strategies by undertaking a detailed assessment of the institutional barriers to shifting mode.
Priority Rideshare Parking	Providing priority rideshare parking is another way to decrease parking demand and encourage more sustainable travel habits. This can be achieved by having rideshare parking available in more convenient locations or for a lower cost. This can be included as part of the hospital travel plans. In New Zealand, Wellington Regional Council has set up a website that workplaces can sign up to and employees can register for carpools. This helps people find others with similar travel patterns. In this scheme, people have the option of looking for other employees from their workplaces or broadening the search to include other workplaces.
Marketing / Travel Awareness campaign	Jepson & Ferreira (1999:17) suggest a "well thought out education and information campaign" as a means of mitigating adverse public perception when travel space is reallocated. If such marketing campaigns are well-executed, they will lead to increased levels of knowledge about the adverse effects associated with driving and stimulate a perception shift, providing the foundation for transitional parking reforms and travel behaviour change. As an analogy, anti-smoking campaigns have led to huge reductions in smoking rates and made increased taxes on tobacco seem more logical.
Public Transport	Having a reliable and efficient alternative to the car travel facilitates acceptance of parking management reform. Reducing the supply of free parking is an effective, coercive demand management strategy, but it must be partnered with non-coercive measures as well. Revitalising transportation networks from being car-dominated to well-integrated and multi-modal takes time. This is because people need time to

Strategy	How the strategy works, Advantages & Disadvantages
	adjust travel behaviour by their own accord, by observing that alternative modes may be a more optimal choice (because of cost, efficiency, etc.). For this transition to take place, a sound public transport system, with the potential to expand, needs to be in place. This system must be at least as attractive as the car. Implementing parking controls will help to ensure its success, and policy should make this clear. As public transport becomes more widely used (either because barriers are overcome or the real cost of parking being charged initiates a major shift in dominant travel modes), the price of operating it and thus for passengers will reduce. Likewise the services will run more frequently, thus be more convenient. This will make travelling by public transport more marginally advantageous in terms of cost than driving (particularly if the real cost of parking is being charged).
Price	Traffic congestion can be at least partially attributed to undervalued parking. If the costs of providing parking (salaries and associated overheads for car park attendants, the administration costs, asset value of land used, taxes, capital to establish car parks, maintenance and repairs) exceed revenue from parking charges, then the establishment effectively subsidises car users, providing an unneeded financial incentive to travel by private car (Tolley, 1996). Thus, in areas where there is an abundance of unpriced on-street parking, parking is effectively subsidised. Hospital staff have a vested interest in ensuring that finances are delivering optimal medical practices and staff salaries rather than parking facilities. The ultimate goal, in terms of pricing parking, is to directly internalise the cost of parking to road users for the fair price of land, but this must be done incrementally, particularly within the context of the area. Priced parking has been shown to be an extremely effective demand management strategy (Shoup, 2005). It provides for high priority customers while discouraging the inefficient use of convenient parking resources by long stay users such as commuters. Priced parking is most appropriately implemented in areas experiencing more than 85% maximum occupancy (as many hospital precincts do) (Litman, 2006). The price level set should aim to keep occupancy levels high, but not saturated, resulting in a situation where a few car-parks are almost always available for those who are willing to pay for them.

Hospital Parking

Hospitals generate substantial travel demands and tend to be markedly stressed with parking demands. Parking pressures can be further exonerated by complementary land uses that develop in hospital areas. Because land tends to be highly valuable in and around hospital environments due to many competing demands, it is important to consider the wider economic efficiency of establishing various land uses. The land that a parking space occupies is often valued at anywhere between $30k - $100k depending on location. In central areas or areas well-served by public transport, where land is highly valuable, this figure could be even higher. The cost of parking is rarely fully paid by the user as many authors document (Shoup, 2005; Seibert, 2008; etc.). In areas, like hospital precincts where land values are great this is inefficient for a number of reasons:

- it promotes vehicle-oriented transport (via parking subsidy), which reduces demand for other services, thereby reducing frequency and thus quality of services of other transport

- it detracts from accessibility of other modes (by taking up land in key locations, thus causing campuses to spread over wider areas of land which worsens the environment for other modes including public transport, walking and cycling.
- by occupying valuable land, activities complementary to hospitals must be located further from hospitals, and are thus less convenient for people who must travel further between the hospital and the development (for example a nurse may have to drive to get lunch).

As previously discussed, the hospital activity will attract a range of travel demands. It is only fair that non-drivers be provided the opportunity to travel to a hospital by means other than taxi, which may be unaffordable

CASE STUDY: WESTMEAD

Understanding parking demand and its wider role in the transportation network is much easier when applied to a subject area. Parramatta City Council, in recognition of the benefits of strategic parking management requested that SKM examine the role that parking in Westmead would play in managing travel demand. Westmead is Sydney's major health service centre in the Western Sydney Region.

SKM undertook this study by examining supply of parking, current parking demand, current parking management practices, all in context of the surrounding transportation network. Parking quantity and restrictions were reviewed, surveys of parking utilisation undertaken, and other information was obtained through stakeholder engagement. .

Context

Westmead is analogous to a number of hospital precincts. It contains one major hospital and some other hospitals and other healthcare services in close proximity, much like Newtown in Wellington. Some university buildings adjoin the precinct as well to serve for medical students, much like Auckland Hospital. It is located approximately 22km from Sydney's CBD and 2km west of Parramatta City Centre.

The surrounding public transport system is good relative to other Australian, New Zealand and North American cities (which tend to have similar land use and travel patterns). There is a railway station and a 'Transit Way[1]' adjoining the hospital precinct in addition to other bus services. Currently a metro or subway service is being considered to connect Westmead (among other western suburbs) to central Sydney. Active mode provision is adequate but still has a fair amount of interaction with fairly heavy vehicle traffic.

The study area has an urban form that would be considered desirable by most planners. The urban form is compact, attractive, with mixed use and pedestrian friendly streets, reflecting urban design theories such as new urbanism. The area has a combination of good public transport, relatively high density housing, cafes and shops, a major park nearby, and major employment/health centres.

In additions to a number of hospitals in the area, an Aged Care Centre is located on the eastern end of Helen Street. There are 4 high schools in the surrounding area and the University of Western Sydney also has part of its campus located within the study area. Parramatta Park is located just east of the study area and contains Parramatta Stadium. The park is a popular spot for recreational cycling, walking and picnicking. The 'target area' contains a number of shops, cafes, and medical clinics. A church is located on the northern corner of Queens Road and Hawkesbury Road.

[1] In Sydney, a 'Transit Way' refers to a dedicated busway which has minimal interaction and thus competition with private automobile traffic.

Background Studies of the Area

A number of background transportation studies undertaken for the area were also reviewed as part of this study. Some aspects of these reports are considered confidential but overall findings include: In 2006 approximately 10,500 journeys were made to the Westmead Precinct in the morning peak, consisting of approximately 50% hospital staff trips, 10% patient trips, 30% high school and primary school trips (staff & student), and the remainder of trips comprised of university students and staff, and other employee trips to the area. Rail accounted for less than 10% of commuter travel and had more student travel than commuter travel (approximately 3:1). The transport choices of staff, patients and visitors are influenced by a variety of factors (access to car, access to parking, household budget, household location, health and fitness, public transport provision, transport network provision, travel time). Despite its apparent accessibility by public transport, especially rail and Transitway, the Campus exhibits very high mode splits to private vehicles. The Campus attracts trips from Western Sydney, and to a lesser extent Metropolitan Sydney/ NSW, however there is a significantly high level of trips from local areas within 5-10km. A significant proportion of the Campus land area is allocated to car parking. There is a current shortfall of existing on-Campus car parking supply during peak hours which impacts upon all users (staff, patients and visitors). Proposed Campus development, including hospital expansion, research expansion, new commercial / retail, new education and new accommodation will significantly increase the transport demand to the Campus. Through encouraging and facilitation travel behaviour change for those able to do so, parking will be freed for those who do not have an alternative to drive, and the amount of additional parking required in the future will be reduced.

Initial Observations

A site visit of the Westmead study area was undertaken to assess the parking situation. The site visit took place between 12:30pm - 7:00pm on Thursday, the 2nd of April, 2009, which allowed for observation of the ebbs and flows of parking demand associated with various activities. A second site visit was undertaken on Saturday the 4th of April 2009 (from approximately 11:30am – 1:00pm) to provide an indication of weekend parking occupancy. The latter site visit was undertaken to ensure that there was not a peak in parking demand on the weekend greater than weekday. This was considered possible due to a possibly increased number of hospital visitors on the weekend combined with the cars of otherwise car-commuting Westmead residents being at their residences. However, the weekend site visit revealed lower parking occupancy than during the week day.

Particular emphasis and detailed public parking observations were undertaken for a 'target area', which was selected as initial communication with Parramatta City Council revealed particular concerns with this area. This area contains a substantial amount of the on-street parking available and is primarily a medium-high density residential area. Information about off-street parking for major travel demand generator establishments (such as the hospitals and University of Western Sydney) were obtained through Question & Answer and through review of existing information.

Current Parking Supply and Restrictions

An audit of on street parking provision was undertaken for the target area and involved mapping out all of the on-street parking in the area and the associated restrictions. Within the target area, some parking has no restrictions, while other parking is restricted to time limits during peak hours (except for those holding resident permits), as well as some parking for handicap or services.

None of the on-street parking within the Westmead area is metered. However, residents can obtain Residential Parking Permits for on-street parking which has a small nominal cost of $10.65/year for Residential Parking Permits and Residents' Visitors Parking Permits. There are fees associated with off-street parking in the Westmead Precinct, most notably at the main hospital where the cost of parking is a nominal $6 and staff parking is $10/wk. The parking fee for patients at the children's Hospital is charged hourly starting at $5 for the first hour and being $16 for five or more hours. The charge for the public to use the UWS campus parking is $2 for 2 hours and $4 for the whole day.

General Observations of Target Area (Weekday)

Within the target area (as defined above), numerous observations were made that are important to this parking study. Parking occupancy provides an indication of parking demand. Indicative observations about weekday parking occupancy were:

- There was greater on-street parking occupancy from approximately 12:30pm – 4:30pm (approximately 90%), with occupancy waning after approximately 4:30pm (to approximately 70% by 7:00pm).

- Parking occupancy was greater in the western portion of the target area (adjoining Westmead hospital) and in the southern section of the target area (adjoining Westmead Station). These areas do have some trip-generating commercial developments (e.g. shops, restaurants), but more importantly, these areas are likely picking up spillover parking from Westmead Train Station and Westmead Hospital.

- Given the abundance of parking on-site at most residential complexes and the lower on-street parking occupancy in evenings, it is presumed that peak parking pressure points occur when the hospital is at highest demand and residents are undertaking a number of trips.

- Many streets within the target area have 2-hour parking (restricted only during peak hours) on one side and unlimited free parking on the other side.

- Only one Residents' Visitors Parking Permit Area 03 observed.

- Some apartment blocks had designated on-site visitor parking.

- Many vehicles were parked 'inefficiently', i.e.– many cars were parked with large gaps between them, but these were not large enough for other cars to fit in and park.

- It was also noted during the site visit that Westmead Hospital has numerous 'pool' hospital cars. This is deemed one very useful way to help manage travel demand, as 'pool' cars are shared, thus, reducing the need for people to bring private vehicles to work to undertake work travel.

- There were many buses travelling in the area, most of which had low occupancy (suggesting that they are under-utilised). This could be because the buses do not serve for individual's travel needs (because of destinations, frequency or running times) or due to the presence of abundant parking which makes travelling by car easy and inexpensive.

- There were extremely long queues of vehicles (primarily single occupancy) leaving the hospital around 5:00pm observed.

Saturday observations

Parking occupancy was lower on the weekend than on weekdays during business hours. This suggests that parking demand in the target area is comprised primarily of overflow from commuters catching the train from Westmead, commuters going to the hospital, the university, or visitors to these or other establishments (e.g. the local medical clinics). Some streets still had very high occupancy on Saturday (between approximately 90 – 95%) It was also noted that streets that have restrictions which are not applicable to weekends have slightly higher occupancy than streets with weekend restrictions (not surprisingly). Overall, parking demand does not appear to be a major issue during weekends. There was substantial parking available, although, if people want to park directly outside of their households, there may not be a space available. Arguably, in terms of managing travel demand, the latter situation is actually beneficial because the slight inconvenience of parking further from one's house contributes to making other modes more equitable in terms of convenience.

Off-Street Parking Provision and Utilisation

Information about off-street parking provision in the precinct was obtained for the hospitals and university areas by reviewing background studies, and through information requests to the hospitals, Council and university about on-site supply, fee structures and utilisation. Off-street residential parking was not specifically audited, but arrangements and indicative utilisation were observed during site visits. This surveying method for residencies was deemed appropriate to the scope of the project. More specific surveying of residential parking would have required obtaining permission from numerous parties as much of the parking in this precinct is not visible from the street.

Background studies show that the four hospitals in the Westmead area have approximately 5,200 spaces with 70% reserved for staff, 25% are shared by staff and patients; and 4% are for patients only. Background studies suggest that the available parking is well used throughout the day and that between 9:00 am to 9:30am, all parking stations are full in Westmead Hospital, with some spare capacity remaining in the Westmead Dental car park and UWS car park. The Children's Hospital parking station is at maximum use at 11:30am when approximately 49 spaces are unoccupied. Staff that arrive early have the choice of parking on nearby residential streets and walking to the Hospital, thereby avoiding the small parking charge. Staff arriving after 9:00am cannot find a parking space easily, either on-street or in the off street parking areas. Staff at all hospitals may obtain paid permits to park in designated staff areas, dependent upon their status and waiting lists.

Staff parking charges are managed differently at different hospitals in the precinct, with one charging staff $2.18 a week with most salary sacrifice car parking but some paying directly. Other staff can use parking but have to pay the same prices charged to visitors. Staff at another hospital pay $20 a fortnight for parking deducted from their pay. There is cheaper parking for 'after hours' permits for staff who enter the car park after 10:30am on a weekday. According to background studies, patient parking is fully occupied at the main hospital after 9:30am. Patients are then redirected to another car park. Some patients try to find a space in the residential streets. One background report suggests that demand for staff parking currently exceeds supply and has done so for many years with staff on waiting lists for several years in order to receive a parking permit. This parking shortage is apparently exacerbated by the overlap in nursing shifts which is required for efficient change over as well as low turnover rate of spaces.

Parking utilisation survey

A parking utilisation survey commissioned by SKM measured occupancy of parking spaces throughout the target area. The surveys took place during three periods of the day during late June, 2009 (from 6:30am – 7:30am; 2:00pm – 3:00pm; and from 7:00pm -8:00pm) to gauge occupancy. Parking spaces were not only monitored to gauge whether or not spaces were occupied, but also the type of occupancy was evaluated. Thus, surveys noted:

- Whether or not a vehicle was parked in a space
- The length of stay of each vehicle
- Whether or not any of the following permits were displayed:
    - Local (residential) permit
    - disabled permit
    - hospital permit
    - Manly Council permit
    - University Parking Permit

The parking occupancy trends audited were consistent with the general observations. Some noteworthy parking occupancy trends include the following:

- Only one University Parking Permit was displayed for the entire area for the day
- 54 Residential parking permits were displayed over the course of the day (however there may have been overlap (one car leaving a spot and returning to another at a different time)
- 80 Disabled parking permits were displayed over the course of the day (however there may have been overlap (one car leaving a spot and returning to another at a different time)
- 18 Hospital parking permits were displayed over the course of the day (however there may have been overlap (one car leaving a spot and returning to another at a different time)
- Long term parking was generally found in areas with no restrictions on parking
- Unrestricted Parking spaces near the train station generally became virtually filled very early in the day (by about 6:30am) and were almost all vacated by 7:00pm
- At peak occupancy times parking is still not saturated, though unrestricted (long-stay) parking is.
- At off-peak times parking occupancy was rather low.
- Most of the unrestricted parking is occupied by long-stay travellers
- 21 cars were parked in the same place throughout all three surveying periods, but not displaying residential parking permits. This either suggests that these people either live in the area but do not hold parking permits or that some of them are spending more than 12 hours at their destination in the Westmead area.

These parking trends suggest that parking is primarily occupied by people travelling to the district during business hours.

DISCUSSION / RECOMMENDATIONS

The case study reveals that parking supply is under significant pressure in Westmead. As described the majority of the cars observed travelling to and from the hospitals were single occupancy vehicles travelling at peak times, thus parking is not being used particularly efficiently. It is recognised that many people in the Sydney area are accustomed to travelling by car conveniently with an abundance of cheap or free parking at their end destination. Thus the objective of managing parking so as to manage travel demand must be balanced with people's expectations. The key to managing parking in the Westmead Precinct is

strategic management with an integrated approach with travel modes other than the private car.

The issue in Westmead Precinct is the availability of un-priced parking. All of the free, unrestricted parking available in the adjoining neighbourhood encourages people to take a gamble to try and find a free parking spot rather than factoring in the cost of parking and the opportunity cost of trying to find a space into their trip planning which might encourage alternative means of travel. The area is well-serviced by public transportation, but the presence of unrestricted parking reduces the attractiveness of alternative modes. The free, un-restricted on-street parking encourages building owners and developers to keep their parking un-priced and bundled into other costs (rents, salaries etc.). If parking in the whole area were charged at its true cost, and partnered with complementary schemes, there would be less demand on parking and higher travel by alternative modes.

Thus, it was recommended that parking which is currently un priced become priced. Some of the recommended strategies for managing pricing included:

- Retain adequate reasonably-priced unrestricted parking for highest-priority users, (particularly, travellers with limited other travel options, such as the mobility-impaired).
- Near the railway station parking can be restricted to rail users and rail users can buy special 'rail parking passes' that enable low-cost parking for regular rail commuters over a long period of time.
- In other areas of unrestricted parking, parking should be restricted by metering (though long-term metering enabled (e.g. 12 hour metering), with residents exempted.
- Work with hospitals to establish a TMA (background reports suggest that parking is poorly coordinated between various parties currently) and develop different parking fare structures:
    - Make parking costs transparent
    - Ensure all parking 'perks' are unbundled from salaries
    - Make rideshare parking lower cost or priority (free for 3+)

There are a number of parking-related initiatives that the major trip generators and Council for this district can do to manage travel demand to improve utilisation of parking supply in Westmead. Some of the recommendations SKM offered council were to provide leadership and assistance to:

- Establish a TMA. This partnership may be able to identify opportunities to 'share parking'.
- Provide subsidised public transport passes through a partnership between council/transport authority & hospitals or free pass promotions (e.g. for one month periods). This should be available for at the least, hospital staff and university students.
- Establish rideshare parking priority schemes & a rideshare database for people to connect to one another to arrange rides.
- Institute a shuttle bus during peak hours between public transportation facilities, the hospital and the campus, replicating the success of Council's Parramatta Loop bus.
- Work with hospitals/university to offer flexible parking permits for occasional car commuters, with specific spots allocated to staff who each receive a few days passes per annum) and incentives not to have a permanent parking place.
- Increase & improve information about public transport services to / from the hospital precinct from a variety of origin locations.

- Work with TMA to 'un-bundle' parking for a variety of developments, including housing complexes so that the real cost of parking is transparent.
- Work with carshare companies to set up cars in Westmead (perhaps with designated or discounted parking spaces)
- Reallocate existing parking for priority users (e.g. disabled near nursing homes)
- Establish secure bicycle parking facilities on or adjoining the hospital campus.
- Establish dynamic, real-time directional signals that enable drivers to find parking more easily. This will have the benefit of reduced driver frustration, increase autonomy, and more efficient use of travel space.
- Undertake a public relations campaign to publicise justification of priced parking and alternative options travel options, RPS, available (clarify that people are just paying for their parking).

While the price of parking at the hospital was only $6.00, this still acts to deter many people from parking there as illustrated by the high occupancy of on-street parking with no restrictions. This puts pressure on unrestricted on-street parking. The solution that becomes increasingly apparent is that parking is not free, thus those using it should be paying for it, at least during times when there is great competition for supply. I would not argue to price parking at off-peak times when other transport options are less viable. All of the parking in the target area that is currently unrestricted needs to be metered (at least during peak times), but perhaps with long-term metering and residents can park for free as long as they hold a permit. Even if the long term parking fees are not very high this will cause people to start seeing parking at the hospitals as competitive with on-street parking, thus freeing up more on-street parking during the day.

If the hospitals increase the rates of payment for parking to the real cost to supply it, they will be more financially capable of developing more parking. If the hospitals have good reputations, fair market parking prices will not deter people from visiting or working at these hospitals. For example, paying $10 over $6 for a parking space when you need major surgery will not be the biggest decision-maker, but rather, the surgeon will be.

While sound economic rational indicates the effectiveness of parking pricing, social equity aspects need also to be addressed. The hospital precinct serves Western Sydney, with arguably a lower socio-economic profile. Priced parking may strike a policy dilemma for hospital administration regarding equity of access. Then again, it could be argued that providing free on-street parking effectively subsidises parking for those that can afford to drive. This is an issue that warrants separate consideration beyond the scope of this discussion paper.

It was also suggested that the Council avoid implementing any minimum parking requirements in district plans until all parking in the area is either priced or restricted by time, if at all. This is necessary to ensure that a market for provision of parking can develop to meet supply. With the status quo parking arrangements, it is unlikely that anyone would develop additional parking (in a garage) with such abundant free or cheap parking available.

CONCLUSION / RECOMMENDATIONS

In review, hospitals have a campus-like environment and generate their own unusual and substantial travel demands which are typically associated with pressure on parking supply. Hospitals can also contribute to demand for complementary activities with further travel demands associated. When thinking of hospital travel demand one may first envisage relatives rushing to a deathbed in a car as fast as possible or a tired nurse leaving at 2:00am. Examination of the case study has shown that in fact demand is typically generated during traditional peak business hours and that parking is primarily allocated to staff, not patients and visitors. Observations also revealed single-occupant vehicle dominated transport (during traditional peak periods), despite adequate public transport services that are planned to be even further improved. The findings of this strategic study suggest that there is great potential to manage travel demand to promote more economically and environmentally efficient travel before further parking expansion is considered.

The key strategies for managing parking or to complement parking management include:

- Removal of Minimum Parking Requirements
- Shared Parking
- Unbundle Parking
- Flexible Parking permits
- Directional signs
- Community Transport Management Associations / joint planning
- Car-share Organisations
- Travel Plans
- Priority Rideshare Parking
- Marketing / Travel Awareness campaign
- Supportive Public Transport
- Pricing (at least during peak hours)

By examining progressive parking management strategies and adjusting them to the hospital context, we are able to promote a transportation network that is more attractive, more economically efficient as well as better for the environment and which suits the particular needs of the hospital environment. People (employees, residents, businesses, patients) benefit by improved parking access (as demand is better managed) and transparent costs from which to make decisions. The strategies and recommendations explored in this paper are applicable to other hospital settings, particularly in New Zealand.

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