Suboptimal smokefree signage at some hospitals: Field observations and the use of Google Street View

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Introduction

Hospitals were one of the first settings in New Zealand to adopt indoor smokefree policies, and they have also been leaders in making their grounds smokefree as well. Given the healthcare orientation of hospitals, these facilities are likely to provide both an educative role and a norm-setting role towards a smokefree society—the New Zealand Government's goal for 2025.[1] However, no surveys of hospital outdoor smokefree signage have yet been conducted in this country—and so we aimed to address this deficit.

Such research can now potentially benefit from the use of Google Street View (GSV), which is being increasingly used in research around built environments. Studies of the validity of data from GSV compared to field observations are generally favourable,[2-6] albeit with some problems with differing image dates on intersecting streets.[7]

Methods

The first step was a convenience sample of 10 public hospitals that were located between Wellington and Gisborne in the lower North Island of New Zealand (road trips in both January and March 2015). The hospitals were identified from a list of 86 public hospitals detailed on the Ministry of Health website.[8] They ranged from having 3 to 369 beds (median: 56.5) and covered five different District Health Boards (DHBs). Data collection included the presence or not of smokefree/non-smoking signage that was visible anywhere from the campus perimeter (ie, excluding roading that was internal to the hospital campus as revealed by the colour shading on Google Maps). Half of the observations were made jointly by two observers (NW and GT) and the rest by the first author (with both authors having experience in studying such signage).[6] The same facilities were then examined using Google Street View (GSV) by an independent observer not involved in the field work (AT—see acknowledgements). This was after training in using GSV with a sample of hospitals elsewhere in the country.

The second step was to study a random sample of 20 public hospitals from around New Zealand (a 26% sample from the list of 86 hospitals,[8] and excluding the 10 hospitals sampled above, and using the random number function in Excel). The selected hospitals ranged from having 8 to 863 beds (median: 70) and covered 12 DHBs. These hospital sites were then examined, using GSV, for smokefree signage at the main driveway entrance (by NW in April 2015). See Table 1 for additional definitions and other details.

Results

In the field observations (Table 1), 90% of hospitals had smokefree signs at the main entrance, and 90% had at least one such visible sign anywhere else on the premises when walking around the perimeter (on stand-alone sign posts, fences or buildings).

Table 1: Sensitivity, specificity and predictive value of Google Street View (GSV) relative to field observations of smokefree signage at a convenience sample of 10 New Zealand hospitals

Performance characteristic of GSV vs field observations	Any smokefree signs at main entrance*	Any other smokefree signs on premises	At least one smokefree sign mentions smoke-free 'grounds' (or site or campus)
True positives (number) [A]	9	6	3
True negatives (number) [B]	1	4	5
False positives (number) [C]	0	0	1**
False negatives (number) [D]	0	0	1
Total (number)	**10**	**10**	**10**
Sensitivity [A/(A+D)]	100%	100%	75%
Specificity [B/(B+C)]	100%	100%	83%
Positive predictive value [A/(A+C)]	100%	100%	75%
Negative predictive value [B/(B+D)]	100%	100%	83%

* That is within 10 metres either side of the edges of the main entrance (defined as the main driveway for all 10 hospitals in this sample) and including blurred signs based on these being likely (50%+ probability) to be smokefree signs when considering colour and shape to the experienced and trained observers. Blurring could be due either to distance or sometimes to the automatic blurring function used by GSV for vehicle number plates.

** This result might not have been a problem with GSV based observations, but rather the field observers may have missed a sign saying "grounds".

Table 2:
Smokefree signage at the entrance to a random selection of 20 public hospitals in New Zealand (sampled out of all n=86 public hospitals in New Zealand, but excluding the 10 hospitals reported on above)

Characteristic	Number of hospitals	Percentage
Any smokefree signs at the main entrance*	10	50%
Other smokefree signs that were visible when the GSV image was centred on the main entrance	1	5%
Any smokefree signs mention 'grounds', 'site' or 'campus'	7	35%

* That is within 10 metres either side of the edges of the main entrance (focusing on the main driveway into the hospital campus (n=19) but if the main entrance was directly onto the street (n=1) then this was used instead). There were a total of 14 signs observed at these entrances.

The average number of signs observed per hospital was 8.6 (range: 0–27; total: 86). But field observation found that only 40% of hospitals had any signs that stated that the 'grounds' were smokefree.

The comparable figures from the independent observer using GSV were: 90% at the main entrance, 90% for any other signs, and the average number of signs was 3.5 (range: 0–21; total: 35). Only 40% of hospitals studied with GSV had any observed signs that stated that the 'grounds' were smokefree.

Assuming that all the field observations were 'correct', the observations using GSV had very good sensitivity, specificity and other characteristics (Table 1), albeit somewhat less favourable for signs mentioning 'grounds'.

The random sample of 20 hospitals nationally using GSV indicated that only half (10/20) had any visible smokefree signage at the main entrance (Table 2). Only around a third (35%; 7/20) had smokefree signage that included words relating to the 'grounds' being smokefree.

Discussion

This small pilot study suggests that GSV is a reasonably valid tool for studying

basic aspects of smokefree signage on hospital grounds. It performs slightly less well in terms of detailed signage wording (the wording around 'grounds') and quite notably poorer in terms of the total number of observable signs. However, the latter limitation could have been reduced further with more training of the independent observer and more time spent using GSV for observations.

Given these results (and other literature—see Introduction), combined with how efficient it is to use GSV for data collection (ie, no travel time or costs required), it is probably desirable for more studies to make use of this tool. That is, it could be used for studying smokefree signage in childrens' playgrounds, parks, campuses, shopping streets and other outdoor settings.

The results of both the convenience and random samples also suggest that there is scope for improvements in increasing the number of smokefree signs at the main entrances to hospitals. Furthermore, there is an opportunity in many places for signs to clearly state that the grounds are smokefree and to make signs larger, as many were quite small and combined with many other different signs at the same spot. Therefore potential responses are that:

1. Tobacco control workers could encourage DHBs to do qualitative upgrades to their signage eg, adopting the large stand-alone signs used at Wellington Hospital that clearly mention 'grounds' (Figures 1 and 2) and that violators will be 'asked to move on' (Figure 2). Some signage could also refer to smoking cessation support (again, there are examples from Capital and Coast DHB, Figure 2).

2. The next upgrade to the Smoke-free Environments Act could ensure that all New Zealand public hospitals are required to have signage at their main road and main pedestrian entrances with signs meeting minimum specifications for size, the use of the word 'grounds', and how violators will be dealt with.

Such changes would probably be very cost-effective approaches to better promoting smokefree hospital settings and hence make an additional contribution towards achieving the Government's Smokefree Nation 2025 goal.

Figure 1: Example of a large smokefree sign mentioning both "buildings" and "grounds" (Wellington Regional Hospital, Capital & Coast DHB)

Figure 2: Example of a 'no smoking' sign that mentions "grounds", the response to violators, and also provides smoking cessation information (Wellington Regional Hospital, Capital & Coast DHB)

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