

## Evaluating environment cleanliness using two approaches: a multi-centred Australian study

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**Abstract. Introduction:** A standardised approach to evaluating environmental cleanliness is important to ensure consistency of assessor training, allow benchmarking of results between facilities, ensure consistency of the assessment of the environment and assist in meeting national accreditation standards. This paper describes the development process and the findings of the first 12 months of data following the introduction of a standardised program for evaluating environmental cleanliness within Tasmanian healthcare facilities using two different evaluation methods.

**Methods:** Evaluation of environmental cleanliness was undertaken as part of a structured program and involved the use of an ultraviolet solution and fluorescent light in addition to a visual assessment. Twelve Tasmanian hospitals participated in this study.

**Results:** A total of 290 fluorescent light assessments and 232 visual inspections were conducted. Using the fluorescent light assessment, the percentage of correctly cleaned items increased from a baseline of 82.3% to 85.4% over the 12-month study period. Using the visual assessment, 92.5% of items were deemed acceptable during the study period.

**Conclusions:** Our multi-centred study identified a high baseline level of cleanliness using a fluorescent light. We identified that objects were frequently deemed to be visually acceptable, yet may not have been cleaned. The project was supported by a range of online tools for data submission, training tools and a formal assessment of auditors.

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### Introduction

Evidence demonstrates that the environment plays an important part in the transmission of healthcare-associated infection,<sup>1–4</sup> thus environmental hygiene plays a critical role in an infection prevention and control program.<sup>5–8</sup> An environmental cleaning program and subsequent assessment (or surveillance) of cleanliness is an integral part of an infection control program, with the goal of ensuring a healthcare environment that is both aesthetically acceptable and has a reduced bioburden.<sup>5,9,10</sup>

The Tasmanian Infection Prevention and Control Unit (TIPCU) published a report in 2012 on the methodologies used locally, nationally and internationally for assessing environmental cleanliness within healthcare.<sup>11</sup> There are two major methods of assessing the cleanliness of the healthcare environment: (1) process evaluation which evaluates the

cleaning process itself and includes visual inspection and fluorescent gel and light assessment; and (2) outcome evaluation which evaluates microbial burden post-cleaning and involves the use of adenosine triphosphate (ATP) or microbial cultures. In Australia, visual assessment is commonly recommended and used as the primary method to assess environmental cleanliness. Visual assessment is also used overseas, for example in the United Kingdom.<sup>11</sup>

The findings of this report were presented to a meeting of Tasmanian stakeholders where there was a decision made that TIPCU would devise and assist in the implementation of an environmental assessment program for use within Tasmanian healthcare facilities. The consensus was that the program would be used across Tasmania in a variety of healthcare settings and would be performed in a standardised manner, by trained assessors using the two process measures

### Implications

- Visual cleanliness assessment may overestimate the level of environmental cleanliness.
- A structured approach, supported by resources, is required to evaluate environmental cleanliness.

identified – visual assessment and fluorescent gel assessments. These methods were chosen due to cost and ease of use. A standardised approach was important to ensure consistency of assessor training, allow benchmarking of results between facilities, ensure consistency of the actual assessment of environmental hygiene, and assist in meeting national accreditation standards, specifically Standard 3 (Preventing and Controlling Healthcare-Associated Infection) of the National Safety and Quality Health Service Standards.<sup>12</sup>

This paper describes the development process and the findings of the first 12 months of data following the introduction of a standardised program for evaluating environmental cleanliness within Tasmanian healthcare facilities using two different evaluation methods.

### Methods

#### *Program development*

The standardised method to evaluate environmental cleanliness included the development of a highly structured protocol outlining the methodology for two types of assessment. The protocol included which environmental sites should be assessed, when to assess, who can assess and data entry requirements. The program also included a standardised online education training program for assessors, an online data entry tool, online resources and a 'Frequently asked questions' brochure.<sup>11</sup>

The four larger Tasmanian public hospitals were invited to participate in a 4-week pilot study to assess the usability and acceptability of the program. Both quantitative and qualitative feedback were sought with the majority of feedback received being positive about the protocol, education and processes. Amendments based on the pilot feedback were made to both the protocol and data collection tool.

#### *Study design*

All Tasmanian public and private hospitals were invited to participate in the program. Invitations were disseminated via email and in person when the opportunity arose. Although voluntary, participation required a hospital executive board member, the manager of environmental services and the manager of the infection prevention and control unit to all formally agree to the hospital's participation in the program. Twelve Tasmanian hospitals participated in the program. The hospitals ranged from rural hospitals to large public and privately funded hospitals.

#### *Procedure*

The evaluation of environmental cleanliness involved two elements: the use of an ultraviolet (UV) solution with fluorescent light assessments conducted quarterly in patient care areas that had undergone discharge cleans, and a visual assessment conducted at least quarterly in both patient care and general ward areas. Cleaning in participating hospitals was undertaken by cleaning staff employed by the hospital.

The UV solution and light method (Ecolab® DAZO®) involved the application of the UV solution to up to eight high-touch surfaces in patient care areas by an auditor. The solution was allowed to dry before cleaning was undertaken. As the gel is easily removed with light abrasion, an evaluation was conducted post-discharge cleaning using a UV light to determine whether the surface had been cleaned correctly. Numerous studies have shown that this procedure improves cleaning practices.<sup>13–17</sup> The UV solution was only applied to rooms or patient care areas that were undergoing discharge cleans. The rationale for this was twofold. First, evidence suggests that prior room occupancy is a risk factor for acquisition of infectious agents.<sup>18–20</sup> Second, the assessment is easier to implement in rooms where patients are no longer present. The objects in patient care areas to which the UV gel can be applied vary in the literature. In our study, the gel was applied to one of the sites detailed in Table 1 in each patient care area. These sites were determined following a review of the literature, the suitability of previously documented sites in the Australian hospital context and consultation with infection control professionals in Tasmania.<sup>13–15,17,21</sup> Once a clean had been completed, the auditor returned to determine which sites had been cleaned. If any level of fluorescence was present, then it was determined that the object had not been cleaned.

Visual assessments were conducted to determine cleanliness in all areas of the hospital. These assessments were developed following a review of approaches taken in two Australian states and current practices in Tasmania.<sup>11,22,23</sup> To allow flexibility and clarity regarding specific items, two different visual assessment tools were used in this study. The two visual areas were defined by the location in which the assessments were undertaken – the patient care areas and the general ward areas. These two areas were clearly detailed for the auditors and were specifically chosen to ensure consistency with the approaches taken in New South Wales,<sup>22</sup> Victoria<sup>23</sup> and existing practices in Tasmania.<sup>21,24</sup> Additionally, some sites were more specific to allow comparisons between the visual assessments and fluorescent gel method. The assessed areas were deemed 'clean' or 'not clean' based on the descriptors provided to the auditors.

To improve inter-rater reliability, only auditors who had received training and successfully completed an online exam were able to undertake assessments. The exam was developed by two experienced, credentialed Clinical Nurse Consultants. Questions in the exam related to key points of the program, including determining whether a site was clean and when to conduct assessments. To assist, the TIPCU developed

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