

Infection Control in design and construction work

Article

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1 INFECTION CONTROL IN DESIGN AND CONSTRUCTION WORK

2 **ABSTRACT**

3 Objective: To clarify how infection control requirements are represented, communicated and
4 understood in work interactions through the medical facility construction project lifecycle.
5 To assist project participants with effective infection control management by highlighting the
6 nature of such requirements and presenting recommendations to aid practice.

7 Background: A 4 year study regarding client requirement representation and use on NHS
8 (National Health Service) construction projects in the UK provided empirical evidence of
9 infection control requirement communication and understanding through design and
10 construction work interactions.

11 Methods: An analysis of construction project resources (e.g. infection control regulations;
12 room data sheets) was combined with semi-structured interviews with hospital client
13 employees and design and construction professionals to provide valuable insights into the
14 management of infection control issues.

15 Results: Infection control requirements are representationally indistinct but also omnipresent
16 through all phases of the construction project lifecycle: failure to recognize their nature,
17 relevance and significance can result in delays, stoppages and re-design work. Construction
18 project resources (e.g. regulatory guidance; room data sheets) can mask or obscure the
19 meaning of infection control issues.

20 Conclusions: A pre-emptive identification of issues combined with knowledge sharing
21 activities amongst project stakeholders can enable infection control requirements to be
22 properly understood and addressed. Such initiatives should also reference existing infection
23 control regulatory guidance and advice.

24

INFECTION CONTROL IN DESIGN AND CONSTRUCTION WORK

25 **Introduction**

26 Effective infection control management is essential throughout the entire hospital
27 construction project lifecycle, being relevant to briefing and design phase work as well as to
28 the building and operational stages of project activity (Stockley et al. 2006). Despite the
29 development of regulations and guidance by government agencies and health bodies on how
30 best to manage infection control issues, these requirements can still be problematic,
31 potentially resulting in delays, stoppages and re-design work. This paper explores how
32 infection control requirements are represented through the construction project lifecycle and
33 how they are understood by hospital construction project participants (i.e. designers,
34 contractors, sub-contractors, client stakeholders). The paper clarifies how INFECTION
35 CONTROL ISSUES RESIST REPRESENTATION, BECOMING CONFLATED WITH
36 OTHER MEDICAL FACILITY REQUIREMENTS infection control issues resist
37 representation, becoming conflated with other medical facility requirements through the
38 design and construction discourse; infection control requirements often needing to be
39 unpicked and prioritized by project participants in order to be resolved. It is argued that the
40 meaning of infection control requirements is obscured by their representational indistinctness,
41 so that a pre-emptive identification and mutual sharing of knowledge by project participants
42 is both necessary and important.

43 The paper uses empirical evidence drawn from a 4-year study of the representation and use of
44 construction project requirements in hospital and medical facility contexts to clarify the
45 processes of communication and understanding occurring when infection control issues are
46 the focus of attention. An analysis of project data resources (e.g. infection regulations; room
47 data sheets) is combined with interviewee insights into the design, construction and

48 maintenance process: this combination of evidence providing valuable insights into the
49 management of infection control issues. A series of vignettes drawn from National Health
50 Service (NHS) hospital construction projects in the U.K. highlights how THE
51 OMNIPRESENCE, INTANGIBILITY AND REPRESENTATIONAL INDISTINCTNESS
52 OF INFECTION CONTROL CAN RESULT IN STOPPAGES, DELAYS AND RE-
53 DESIGN WORK the omnipresence, intangibility and representational indistinctness of
54 infection control can result in stoppages, delays and re-design work, often necessitating
55 complex processes of meaning making between project participants. Such associated
56 processes of making meaning often evade critical analysis and examination, despite their
57 impact upon the design, construction and facility management process. It will be argued that
58 infection control requirements need to be pre-emptively identified as associated guidance is
59 often too generic for the questions at hand: a sharing of knowledge between parties being
60 both important and necessary to prevent delays, stoppages and re-design work from
61 occurring.

62 The paper begins by reviewing the existing infection control guidance and literature and the
63 construction project lifecycle. The paper notes how infection control requirements are
64 commonly represented in construction project design and construction work (i.e. through
65 briefing statements; regulatory guidance; room data sheets). A research methodology section
66 details the empirical work undertaken and the data collected for the study. This is followed
67 by a focused account of infection control work at different stages of the hospital construction
68 project lifecycle (i.e. design; construction; operation), with vignettes being drawn from NHS
69 hospital construction projects in the UK. These vignettes highlight the omnipresence and
70 representational indistinctness of infection control issues as the significance of obtaining
71 mutual understanding between parties is noted. A following discussion notes how project
72 resources do not necessarily assist in a clarification of issues or concerns relating to infection

73 control requirements: a pre-emptive identification of issues and a mutual sharing of
74 knowledge being both necessary and important throughout the medical facility lifecycle. The
75 recommendations presented to assist practitioners reference the invaluable existing literature
76 and guidance on the subject (e.g. Dept. of Health, 2013; Bartley, 2000; Stockley et al., 2006)
77 whilst making some fresh suggestions that reference the observations and insights of the
78 paper. A closing conclusion draws the main arguments of the paper together.

79 **Infection Control and the Construction Project Lifecycle**

80 The importance of effective infection control management is reflected in governmental
81 guidance and regulations about the subject published in both the U.S. (Agency for Healthcare
82 Research and Quality – AHRQ) and the U.K. (Dept. of Health). In their latest published
83 advice regarding the subject, the UK's Department of Health (2013) gives detailed
84 instructional guidance for infection control management at the various stages of the
85 construction project lifecycle. As noted by Davies (2013), the design, construction and
86 maintenance of healthcare facilities have a substantial bearing on the risk of developing
87 healthcare-associated infections. Such governmental guidelines are invaluable for NHS staff
88 tasked with infection control work in the UK and offer important information for effective
89 infection control management. Health professionals and academics have also made
90 contributions individually and collectively to the field (e.g. Bartley, 2000; Carter & Barr,
91 1997; Stockley et al., 2006) and continue to emphasize their importance (e.g. Hamilton,
92 2013). In their 2006 paper, Stockley et al. present comprehensive recommendations
93 regarding how best to approach effective infection control management at different phases of
94 the construction project process, giving advice and recommendations that remain valid.
95 However, such publications do not address how the representation of infection control
96 requirements effects communicative interactions occurring in design and construction work

97 contexts, nor do they provide tangible examples of how infection control requirements are
98 addressed and resolved. This paper specifically exposes such issues for examination.

99 The construction project process is traditionally divided into distinct phases that together
100 constitute a lifecycle (figure 1).

101 [insert figure 1 here]

102 As noted by Stockley et al. (2006), infection control is relevant to each of these phases of the
103 construction project lifecycle. It is worth noting that each party engaged upon a project (i.e.
104 the hospital client; design consortia companies; contractors; sub-contractors), at whatever
105 stage of the project lifecycle, will declare their commitment to effective infection control
106 management through policy statements and work contracts. Infection control is commonly
107 viewed as a type of requirement, but the design and construction literature is largely silent on
108 how this particular requirement is dealt with by construction project practitioners. Indeed,
109 although briefing (also known as programming in the U.S.) and design is recognized to be a
110 social process (Green, 1996), with communication being critical for shared interpretations
111 and understandings to take place (Dainty et al. 2006; Emmitt and Gorse, 2007), how different
112 requirements are represented and understood by participating project parties often evades
113 critical analysis. As Blyth and Worthington (2001) have asserted,

114 “Successful briefing demands attention to communication and how information is structured
115 and passed through the system. Designers speak different languages to users, yet they must
116 understand the business language of their clients for there to be meaningful communication
117 of needs. Dangers lie in misunderstandings, but also in assumptions where one person
118 interprets something differently from another.” (p.12)

119 Certainly, construction project lifecycle communications between parties are characterized by
120 sign use (e.g. texts; drawings; visualizations) as project actors discuss, co-operate and

121 collaborate. Although official codes of practice for construction project management (e.g.
122 Chartered Institute of Building – CIOB, 2010) highlight effective communication as
123 important, the significance of meaning making between parties in acts of communication is
124 often overlooked in briefing and design texts (e.g. Barrett and Stanley, 1999; Blyth and
125 Worthington, 2001). Whilst information exchanges have been called the “fuel of design”
126 (Baldwin et al., 1999, p.155), academics and commentators (e.g. Markus and Cameron, 2002;
127 Kamara et al., 2000; Blyth and Worthington, 2001) have also observed that requirements are
128 “translated” from one communicative form (i.e. words) to another (i.e. schematic drawing;
129 visualization; physical model). While communicative resources such as briefing texts,
130 drawings and images make meanings and shared understandings (Gluch and Raisanen, 2009)
131 in construction project work, it has also been noted how sign communications provide a vital
132 link between the realisations of design and the cognitive interpretations of construction
133 project stakeholders (Collinge and Harty, 2014; Collinge, 2014). From a medical facility
134 construction project perspective, it is important to clarify how infection control requirements
135 are communicated and understood by project participants as effective infection control is
136 recognised as pre-eminently important (Dept. of Health, 2013; Hamilton, 2013).

137 **Research Methodology**

138 A 4 year study into the design and construction of National Health Service (NHS) hospitals in
139 the UK examined client requirement communication and representation amongst construction
140 project participants (i.e. the hospital client; designers; contractors; sub-contractors). A series
141 of 21 semi-structured interviews with NHS representatives and hospital design and
142 construction professionals clarified building and design work interactions and the use of
143 infection control requirements. Interviews were supplemented by the collection of project
144 materials (e.g. briefing documents; visual images; room data sheets) drawn from medical
145 facility construction projects. It should be noted that none of these materials represented

146 infection control issues in any visual or graphical way. This may be explained by infection
147 control requirements not being amenable to visual or graphic representation as neither the
148 infection concept nor measures used to combat them are easily represented in briefing and
149 design communications. Whilst infection control precautions are represented in functioning
150 medical facilities (e.g. hand washing instructions above sinks), this is not the case for
151 communications between project parties engaged in design and construction work. The
152 project materials collected indicate that physical and structural design issues dominate
153 communicative exchanges between client, designers and contractors, as may be expected in
154 the briefing and design phase of a construction project.

155 The paper will now discuss how infection control requirements are represented at different
156 phases of the construction project lifecycle, exploring how they are understood and resolved
157 by project participants. A series of vignettes of construction project activity are provided to
158 clarify and elucidate the issues underlying infection control communications occurring.

159 **Planning and Initial Representations**

160 Infection control requirements are associated with the functionality and operation of a
161 medical facility rather than its` physical and structural elements, as the following statements
162 drawn from an Invitation to Participate in Competitive Dialogue (ITPD) briefing document
163 issued to competing construction design teams in the UK indicate:

164 “It should be noted that venetian blinds and curtains have infection control implications that
165 must be considered and must conform to fire safety standards.”

166 “Bidders should be aware that infection control requirements may influence the type of
167 signage.”

168 “The use of design to effectively control infection is essential. All current, relevant and
169 developing control standards must be adhered to.”

170 “Designers should refer to the Trust’s Infection Control Policy and HFN 30 “Infection
171 Control in the Built Environment.”

172 As such briefing statements indicate, infection control requirements initially reference
173 specific regulatory guidance together with aspects of design, with the use of words resulting
174 in infection control being presented in a strategically neutral way as text is a neutral conveyor
175 of information (Medway, 1996).

176 In the U.K., infection control issues are addressed through regulatory guidance and standards,
177 such as Health Technical Memoranda (HTM) and Health Building Notes (HNB) (NHS
178 Estates, 2002). A knowledge of such regulations is necessary for construction project work
179 to comply with required standards. The immediate conflation of infection control
180 requirements between an aspect of design (e.g. curtain material; light fitting; door handles)
181 and appropriate regulatory guidance (e.g. particular cleaning regimes; liquids) requires a
182 relational link to be made by project parties. Such regulatory guidance documents have
183 general applicability for multiple projects, so the onus is upon the project participants to
184 identify and apply the regulations where appropriate. An interviewee noted the ambiguity
185 surrounding infection control issues which the printed regulatory guidance does not assist in
186 clarifying:

187 “We do try to do as much as we can with HTM but it is not always easy. There is always an
188 ambiguity on what falls down on HTMs...what is considered “must-be” rigid. So that is
189 where there is some ambiguity. Infection control.” (Project Manager)

190 The generality of the regulatory guidance must be matched to the specifics of the construction
191 and design question at hand, with objects, equipment and spaces within facilities needing to
192 comply with codes of practice: an ambiguity over correct interpretation of infection control
193 being an immediate potentiality. So, although infection control appears quite definitive and

194 factual (being tied to official instructional regulatory guidance), questions of ambiguity
195 remain, only to be potentially resolved when a specific design proposal is cross-examined
196 closely against infection control requirements. From such initial representations, correct
197 interpretation of infection control requirements and application of appropriate measures
198 remains an open question as they are effectively passed over to the design team to deal with
199 at the appropriate time. As will be noted, in later phases of the construction project
200 lifecycle, infection control is represented through other project communications (e.g. room
201 data sheets). Such communications also impact how infection control is understood and
202 engaged with by construction project parties.

203 **Design phase work**

204 As previously highlighted, in design work various communicative resources (e.g. schematic
205 drawings; visualizations; artist impressions) are used to convey ideas, concepts and plans
206 between project parties. Neither infection control nor the measures used to combat it are
207 represented visually in such project materials as infection control is not amenable to graphic
208 representation in the design discourse between hospital client and design teams. Despite this
209 representational indistinctness, project stakeholders may still identify infection control issues
210 from project materials used in design work. For example, an NHS Head of Facilities
211 identified infection control requirements from a visual image of a patient room, although the
212 image itself highlighted the furniture fittings, space and decoration of a proposed patient
213 room,
214 "It is things like around the light switches, if you don't put protectors around the switches and
215 you have got cheap paint, you get a big grey mark all around it. And it is not dirt, but the
216 perception is that it is dirty which is what the NHS is trying to avoid... When it comes to

217 choices of actual colour schemes and fabrics we no longer have chairs like this because you
218 cannot clean fabric chairs to the standard that infection control require.”

219 Infection control may not be explicitly identified or addressed on a design representation, but
220 will still be present nevertheless. Therefore, associated infection control issues need to be
221 identified, extrapolated and resolved. The NHS Head of Facilities provided a further
222 example, when stating,

223 “They put things in like beautiful uplighters that look gorgeous on the wall but there is no
224 cover on the top and what happens in Summer? They are very bad for hospitals: they are
225 almost impossible to keep clean because domestics are not allowed to touch electrical things.
226 These uplighters constantly cause problems; patients complain that they are filthy because
227 they get filled with flies and dust. And people sitting in the waiting room look around and
228 see these and think “what is that?”

229 Possessing knowledge of infection control issues and sharing that knowledge with other
230 parties is critical to effective infection control: the decision to use a certain fabric or to use
231 lights without covers may have associated infection control issues. The representational
232 indistinctness of infection control in design phase work means that either client, designers or
233 contractors must be aware of them and take that extra step of addressing them. It is very
234 possible that such issues are passed over in design phase work as the infection control
235 regulations require a link to be made between a design issue and the official guidance. As the
236 examples indicate, project parties may have advanced levels of infection control knowledge
237 but sharing that knowledge at an appropriate time is important as the requirements
238 themselves are not explicitly represented through sign communications.

239 **Construction and fitting-out**

240 In the construction and fitting-out phase, when a facility is built and rooms/spaces are
241 equipped, infection control requirements are important again. If refurbishment work is
242 required in an existing hospital, infection control is a particular priority because operational
243 hospitals are highly sensitive environments where construction work has obvious
244 implications for patient care (i.e. noise; dust; vibrations). Understanding how infection
245 control requirements are represented in such work is informative. Room data sheets are
246 commonly produced by hospital clients prior to the equipping of specific rooms, being
247 divided into distinct sections (e.g. Environmental Data; Room Design Character; Schedule of
248 Components). Figure 2 is a room data sheet drawn from the project materials collected for
249 the study.

250 [insert figure 2 here]

251 An interviewee elaborated upon the use of room data sheets:

252 “Room data sheets are provided in draft form. As a result, in theory you get fully loaded
253 drawings. And it may take more than one attempt to fine tune it where the sheet needs to be
254 signed off by stakeholders. There is a series of meetings where architects, principal
255 contractors and client representatives come together and find consensus in terms of what is
256 required, the function of the room, its purpose, occupants and equipment.” (NHS
257 Commissioning Manager)

258 As indicated on figure 2, room data sheets reference infection control requirements as well as
259 other issues such as room fittings and window/door specifications. They are instructional
260 documents to provide designers with information needed to transform a design into a physical
261 reality. Infection control issues are addressed through textual reference to regulatory
262 guidance:

263 “It lists activities, what is going to happen in the room...so there is a list which enables
264 architects to design rooms in terms of the HTM, HBN regulations. They will come up with a
265 draft and will list how many personnel will be in the room, the planning relationships
266 between rooms and additional notes.” (NHS Commissioning Manager)

267 Although room data sheets give direct instructions to designers (e.g. type and quantity of
268 room components), the use of words effectively closes down interpretive possibilities. Text
269 often closes down interpretative possibilities rather than opening them up (Medway, 1996),
270 with the text and box formatting of the sheets representing room activities as separate,
271 discreet events as room components are separated from activities. An interviewed NHS
272 Design Development Manager clarified how room data sheets do not necessarily assist in
273 resolving infection control issues when it comes to detailed design work. Referring to
274 potential dust accumulation on cabling above a patient operating table, the room sheet
275 instruction and regulatory guidance needed to be supplemented with further activities and
276 materials:

277 “As far as infection control, it was a dust collector...but the designers could not think about
278 the set-up of the Endoscopy room, so we took them there to look. The same with the
279 Decontamination Service with the washer disinfectant and an Endoscopic Reprocessing Unit.
280 We also provided photographs of pieces of equipment that were supplemented to the brief
281 because although the brief described a room, you realise they didn't understand what you
282 were saying. And they are building people, not clinical people. And healthcare moves at
283 such a fast pace, you wouldn't expect them to know the clinical functionality or the procedure
284 within a room...So I wouldn't just depend on a brief...If it was just a line in the brief, I don't
285 think you would get such a good end product.”

286 The insight reveals how the challenge of representing infection control leads the hospital
287 client to supplement the brief with photographs, a physical visit to an existing facility and
288 verbal explanation: these extra materials and communications being needed to educate
289 designers about the infection control issue. So, whilst the room data sheets flag up the
290 requirement, they do not clarify the issues; the text and box formatting masking and dividing
291 issues: photographs, physical visit plus verbal explanation being needed for understandings to
292 be shared between client and designers. In this instance, spoken explanation may have been
293 particularly important as just a physical visit or photograph may not have been adequate to
294 explain the issue effectively.

295 By using pre-formatted headings (e.g. Activities; Personnel; Environmental Data), the room
296 data sheets divide subject matter, potentially creating ambiguities that need to be untangled.
297 Additionally, by directing designers to regulations (e.g. “Finishes to comply with
298 performance requirements for Building Elements used in Healthcare Facilities 8941:0.6
299 England) and individual room components, data sheets not only divide components from
300 regulations, but distance components from their actual use in the room space. Whilst
301 defining a relationship between Trust and designers (being instructional and authoritative),
302 the sheets also define a relationship between room contents and related regulations as
303 requirements are divided from regulations and objects from activities. The sheets also give
304 the impression that issues relating to room functionalities have already been resolved (or can
305 be dealt with quickly): the sheet format suggesting any issues are amenable to quick turnover
306 and resolution. However, the cable dust story indicates how room data sheets may mask
307 issues rather than flag up their significance: the text communication and instructional tone
308 adding urgency to the tasks detailed rather than prompting the project parties to think
309 reflectively about their work. Certainly, designers and contractors are not actively
310 encouraged to query and question the information on the sheets.

311 At this stage of the construction project lifecycle, the client may be eager to complete and
312 equip the medical facility, and the room data sheets assist this objective by closing down
313 interpretive possibilities through the delivery of commands and data using text. However, as
314 noted, TEXT CAN OBSURE FUNCTIONAL REALITIES AND CONFLATE, RATHER
315 THAN CLARIFY INFECTION CONTROL ISSUES text can obscure functional realities and
316 conflate, rather than clarify infection control issues, complicating the fitting out process as a
317 result.

318 **Operation and Maintenance**

319 INFECTION CONTROL ISSUES RESONATE BEYOND PLANNING, DESIGN AND
320 CONSTRUCTION TO THE OPERATION AND MAINTENANCE OF A MEDICAL
321 FACILITY Infection control issues resonate beyond planning, design and construction to the
322 operation and maintenance of a medical facility. Interviewees provided further insights
323 regarding how infection control issues are dealt with in these phases of the construction
324 project lifecycle. An NHS Project Manager commented,
325 “Misinformation or misunderstanding over infection control can be transferred down the line
326 from principal contractor to sub-contractors. They see the physical aspects, but they can’t see
327 the consequences of their actions...it is blind to them. It is a blind aspect.”

328 A Project Manager provided a tangible example of this occurrence happening:

329 “There is a process and there is a way of going about that process. I can say to somebody
330 that I need that floor cleaning and he could turn up with a dirty mop and that is not good
331 enough for a hospital environment. It has to be absolutely spot on. Just something simple
332 like that can cause us a massive problem on infection control.”

333 In operational and maintenance work, different problems can occur ranging from sub-optimal
334 identification to misinterpretation of an infection control issue. Although contractors may

335 express commitment to infection control management through contractual agreements with
336 the client (expressing knowledge and experience in such matters), the omnipresence of
337 infection control can be lost in the cut and thrust of busy operational maintenance work. This
338 results in further education and learning work, as noted by another interviewee:

339 “Sometimes you have to go through an educational process because a principal contractor
340 will put forward contractors who have never been in a hospital environment and they will
341 need educating on what is required and expected. So there is a gap between the principal
342 contractor who say they have health experience and the subcontractors who have not. They
343 will sell themselves on that and then employ people who have not got the experience. So it is
344 a big shortfall.” (NHS Building Services Engineer)

345 Verbal and written commitment to infection control measures may not translate to actions on
346 the ground, with infection control implications of particular tasks being missed by contractors
347 working on a job. The NHS Head of Facilities clarified how discussion and communication
348 is key to prevent poor infection control practices from occurring:

349 “We have a policy for contractors and if they do not comply, we will throw them off site.
350 Sometimes subcontractors or contractors will forget to tell me what they are going to be
351 doing and they will crawl through the corridor ceiling pulling wires through at night when it
352 is quiet. But they won’t have told my staff and in the morning the main corridor will be
353 covered in dust from the ceiling. They thought it was a good time to do the work but they
354 were forgetting it is a hospital. So when they do that kind of work, I insist they let us know
355 so we can clinically clean the area before it opens the next morning.”

356 The example illustrates how communication and a pre-emptive identification of potential
357 problems is important for effective infection control management as infection control issues
358 can effectively slip under the radar unless identified and addressed. Again, the

359 representational indistinctness of infection control requirements can have adverse effects in
360 the hospital environment.

361 **Discussion**

362 The paper has discussed the nature of infection control requirements through different phases
363 of the construction project lifecycle. The importance of communication and a pre-emptive
364 identification of infection control issues has been emphasized through illustrative vignettes of
365 practice. It has been noted how infection control requirements resist representation,
366 potentially creating problems for designers, contractors and the hospital client. Project
367 resources such as briefing statements, regulatory guidance and room data sheets do not
368 necessarily assist in a clarification of issues or concerns relating to infection control
369 requirements as design resources such as schematic plans, drawings, images and
370 visualisations may not represent infection control requirements in any tangible way. When it
371 is considered that infection control requirements may merge with other requirements in
372 hospital construction project work (e.g. a light fixture may be visually attractive but
373 functionally questionable from an infection control perspective), infection control
374 requirements often require conversation and discussion between project parties for adequate
375 understandings to be made. This process of shared meaning making requires attention,
376 collaboration and time. The making and sharing of meaning is an aspect of construction
377 project work largely neglected by the construction management literature even though there
378 are repeated calls for more knowledge sharing and participatory design practice. Indeed,
379 although briefing and design work is often reported as problematic, the paper has unravelled
380 the meaning making processes that reside at the heart of interactions between project
381 stakeholders when intangible and representationally indistinct requirements (such as infection
382 control), become the focus of attention between client, designers and contractors.

383 In arguing that design concerns meaning, Kazmierczak (2003) pointed out that designs are
384 cognitive interfaces that enable the reconstruction of intended meanings between parties,
385 stating,

386 “Design needs to be freed from the preoccupation with appearances, and advance to an
387 alternative theoretical model, which relates physical form to cognition and comprehension.”
388 (p.47)

389 The insights of the paper support this contention: representationally indistinct infection
390 control requirements need to be identified and then communicated using the most appropriate
391 method, whether spoken explanation, written text or a combination of resources used
392 collectively. Their indistinctness suggests A PRE-EMPTIVE IDENTIFICATION AND
393 DISCUSSION OF INFECTION CONTROL ISSUES AND A SHARING OF
394 KNOWLEDGE IS DESIRABLE FROM HOSPITAL CLIENT, DESIGN TEAM AND
395 CONTRACTOR PERSPECTIVES a pre-emptive identification and discussion of infection
396 control issues and a sharing of knowledge is desirable from hospital client, design team and
397 contractor perspectives. The paper makes the following recommendations.

398 **Recommendations**

399 Firstly, the value and importance of existing governmental regulatory guidance and advice
400 regarding effective infection control management must be acknowledged. Parties engaged in
401 any medical facility design and construction work should, as a matter of course, consult the
402 relevant national guidelines and advice (e.g. Dept. of Health, 2013). Additionally, published
403 academic work (e.g. Stockley et al. 2006; Bartley, 2000) concerning infection control should
404 also be consulted and reviewed by dedicated hospital members of staff (i.e. an Infection
405 Prevention and Control Team) and design and construction professionals as they contain
406 valuable information to assist in effective infection control management. Previous

407 publications have emphasized the following points for effective infection control

408 management:

- 409 • An awareness of the relevant regulatory guidance (e.g. Health Building Notes;
410 Health Technical Memoranda) pertinent to new build or refurbishment projects
- 411 • The need for group work and collaborative partnerships between medical facility
412 staff and design and construction professionals to specifically address infection
413 control
- 414 • To continually monitor developments during construction work in relation to
415 infection control issues
- 416 • The establishment of a dedicated IPC (Infection Prevention Control) team to engage
417 with a project at each phase of the construction project lifecycle (as part of a robust
418 quality control process)
- 419 • Plans and work to be signed-off by the dedicated infection prevention control team
420 at each phase of the construction project lifecycle

421 In addition to the above, some further recommendations can be proposed based upon the
422 paper findings:

- 423 • Project participants must be aware of the nature of infection control requirements and
424 issues (i.e. that they resist representation but remain omnipresent in all questions of
425 design and construction)
- 426 • Knowledge of effective infection control management may be spread throughout the
427 hospital organisation amongst different stakeholder groups: establishing knowledge
428 sharing processes is important

- 429 • Each specific construction job task (e.g. checking of ceiling wires; demolition of
430 internal/external walls; painting of surfaces); each piece of equipment used (e.g. tools;
431 footwear) and each piece of medical equipment effected (i.e. installation of; use of;
432 maintenance of; cleaning of) will have associated infection control issues. Questions
433 should be directed towards each of these aspects in design and construction work.
- 434 • Pre-emptive identification and discussion of infection control can prevent delays,
435 stoppages and re-design work from occurring. Potential solutions would be to
436 highlight infection control risks to contractors coming on-site (e.g. images of a dirty
437 mop/boots in induction manual; images of medical equipment with accompanying
438 question marks)

439 One further recommendation is made to assist best practice:

- 440 • More research work (e.g. focus group workshops) should be conducted to identify best
441 evidence-based practice for the communication of infection control requirements
442 through all phases of the construction project lifecycle

443 Through a mutual sharing of knowledge (both internally and externally to other health service
444 providers), the complexity of infection control issues may be appreciated by all project
445 stakeholders.

446 **Conclusion**

447 The paper has extended understanding of infection control issues through recognition of how
448 such requirements are communicated and understood through the construction project
449 lifecycle discourse. It has been argued that all parties engaged should recognise the nature of
450 infection control (i.e. its` omnipresence and representational indistinctness) and how it is a
451 potentially problematic issue in the different phases of the construction project lifecycle.

452 Information resources used to refer to infection control issues do not address the specifics of
453 the infection control issue at hand, meaning that collective discussion and a sharing of
454 knowledge between project participants is often needed. The vignettes of the paper from
455 different phases of the construction project lifecycle point towards a social explanation and
456 understanding of infection control requirements where communicative interactions are
457 integral to understanding design work practice, confirming the view of both Kao and Green
458 (2002) and Emmitt and Gorse (2007) that design should be a social, co-operative process.

459 The findings suggest that construction project work is often about the making and sharing of
460 meanings, with communicative resources (i.e. briefing texts; regulatory guidance; room data
461 sheets) being intrinsically important in the meaning making process through their
462 representation of requirements. Whilst understanding client requirements is important, the
463 processes of making meaning from the requirements can be of equal significance to the
464 briefing, design and construction process. The paper has highlighted the complexity of
465 infection control issues and how a pre-emptive identification and discussion of issues is
466 necessary and important in each phase of the construction project lifecycle.

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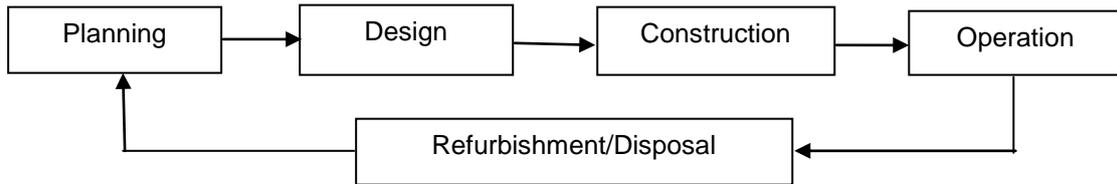
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529 Figure 1: Different phases of construction project lifecycle (adapted from Cranwell and
530 Hunter, 1997)

531

ADB	Room Design Character	B1603
Project:	COCHN	extension for new ICU, Inpatient Beds & Bariatric Services Acc
Department:	ICU	21 bed Integrated Critical Care Unit
Room:	B1603	Single-bed room: critical care.
Room Number:	101, 102, 107, 108, 109, 111, 112, 114, 115, 116, 117	Revision Date: 03/08/2012
Walls:		
Floor:		
Ceiling:		
Doorsets:	1 x 1500 mm, double leaf, sliding, glazed, manual operation.	
Windows:	Clear, solar control, privacy control.	
Internal Glazing:	Clear, privacy control.	
Hatch:	N/A	
Notes:	<p>Finishes to comply with Performance Requirements for Building Elements Used in Healthcare Facilities 8941:0.6 England; Element 1: Floor finishes and skirtings; Element 2: Walls/Partitions; Element 3: Ceilings; Element 4: Sanitary assemblies</p> <p>All finishes to be selected using the "Selection Procedure for Finishes" included in 8941:06: England</p> <p>All finishes selected must have an appropriate risk assessment to accompany the design decision.</p> <p>Infection Control must be consulted as described in Performance Requirements for Building Elements Used in Healthcare Facilities 8941:0.6 England</p>	
 Activity DataBase 03/08/2012		

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Figure 2: Room data sheet with infection control instruction

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