Welcome to the UT ERI Stream, "Use of Next-generation DNA sequencing for infectious disease control: Phase I - baseline"

The deliverables of this project are expected to be:

a) the science: assess the baseline bio-distribution of bacteria on common surfaces found in a hospital compared to a University
b) the business: evaluate the financial impact of hospital-borne infection, MRSA infections, and the value proposition for NGS in that context.

We expect these may change as we proceed with the study.

Step 1: Figure out where and how to collect samples

(Comments in green are Kim)

(Comments in red are Eric)

10 sites total max: ideas:
Paired sites, UT to hospital:
Door knobs - high volume doorknobs- I noticed that when I was at the hospital there were not that many door knobs. The doors were automatic to the entrances to different wings of the hospital and to the entrances and exits of the hospital, so most people will not come into contact with these surfaces. The only doors that people come into contact with are individual office door knobs and patient room push doorknobs.
These areas are not necessarily high traffic, so I was thinking we could change this to nurses stations versus help desk stations at UT?
Toilets - I don't think this will be necessary since these areas tend to be rated very low in regards to the amount of "nasty" bugs that are present on the surface.
Waiting room chairs - UHS vs. DCH
Doctor's coats/scrub/lab coats
Stethoscopes
Blood pressure cuffs - UHS vs DCH- I'm not sure about this one either- its in the same boat as the toilets for me. I am assuming that patients who get their blood pressure taken will not have an open sore underneath the cut to get exposed to anything. Also, the blood pressure cuffs are normally not transported between patients, so the cuffs are not exposed to very many patients per cuff. I have even seen disposable cuffs now since my mom and dad were in the hospital.
Gift shop/gifts - COOP vs. DCH gift shop
Cafeteria - food trays/pay area counter - Jester City Limit (JCL) vs. DCH- Will we need to distinguish between food contamination and surface contamination?

Relevant papers:
Surveillance of legionellosis and Legionella bacteria in the built environment in Singapore.
Surveillance of multidrug-resistant environmental bacteriahttp://books.google.com/books?id=xA4TBP7iqRwC&pg=PA69&lpg=PA69&dq=environ mental+bacteria+surveillance&source=bl&ots=7V7reyINoW&sig=_OLMC6GCCGqw9kdkpmPG6UIGi&hl=en&sa=X&ei=GXJGT5vVIJTPgAeFg4 WNNDg&ved=0CHIQ6AEwBw#v=onepage&q=environmental%20bacteria%20surveillance&f=false
http://www.tufts.edu/med/apua/research/israr_2_4200838854.pdf
Comparison of random sequencing vs 16S

Want to measure variance, balanced with cost & time.
Suggested: swab multiple examples of the same type of site.
Assume 750ul of lysis buffer will be needed.

Step one: Group the areas together and determine the number to be swabbed for each area.

Waiting room chairs: Use one swab to swab three? chairs in one site. Repeat twice (possibly in different waiting room areas). The three chairs should be in high contact areas, such as near magazines, in front of the TV, and closest to the door.

For Dell Children's hospital: swab the Emergency room chairs, the day surgery waiting room chairs, and another site that has a high volume of patients.

For UHS: swab the chairs on the first floor outside the pharmacy where patients check in, Women's center chairs, and possibly repeat at one of these sites.

Swabbing technique:
1. One swab will be used for three chairs per site.
2. Squeeze excess liquid out of the swab using the side of the vial.
3. Swab both arm rests and the back of the chair for each chair.
4. Place the swab at a 30 degree angle to the surface and move it in a zig zag pattern across the surface applying slight pressure and rotating the swab clockwise.
5. Repeat for the next two chairs.
6. Place swab in vial and label.
7. Repeat for the next waiting room area.

For Doctor's coats/lab coats:
Use swabbing technique above on both forearm portions of the sleeves. Attempt to get at least two samples per swab.

For stethoscopes:
Use the swabbing technique above on the metal portion of the stethoscope. Try to attain two to three per swab (possibly from the same source — more than likely nurses because they will have more patient contact than doctors)

Gift shop — either the gift shop counter, or the gift shop drink coolers.
Use the swabbing technique above on the surfaces.

Would it be possible to identify the organism's present on a scale of "nastiness"? I mean that there may be lots of microorganisms present on the toilet, but none are particularly hazardous to human health or cause disease. This would alter the results because if we found lots of microorganisms on a site, but none were known to cause disease, wouldn't that mean that it was not a surface of contact that was dangerous?

**Step 2: Isolate DNA and sequence samples**

I have some results from the Nano drop.

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<thead>
<tr>
<th>Location</th>
<th>260/280</th>
<th>ng/μL</th>
</tr>
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<tbody>
<tr>
<td>JCL tray 1</td>
<td>1.40</td>
<td>11.7</td>
</tr>
<tr>
<td>JCL tray 2</td>
<td>1.15</td>
<td>4.0</td>
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<td>JCL counter 1</td>
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<td>2.5</td>
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<td>JCL counter 2</td>
<td>1.34</td>
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<td>Jester door 1</td>
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<td>1.18</td>
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<td>2.3</td>
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<tr>
<td>UHS chair 2</td>
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<tr>
<td>UHS p-cuff 1</td>
<td>1.16</td>
<td>3.1</td>
</tr>
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</table>
UHS p-cuff 2 : 260/280 = 1.74
ng/microliter = 3.0

Step 3: Sequence samples

Step 4: Economic analysis: when and how much would someone pay for this?

Step 5: Data analysis

Data analysis

Meeting minutes 22Feb12