#WeAreNotWaiting
in Healthcare
(or how I built an artificial pancreas & what you can learn from it!)

@DanaMLewis
There are 10 kinds of people in the room.

(Those who appreciate binary jokes and those who do not.)

@DanaMLewis
There are 10 kinds of people in the room.

(Those who naturally produce insulin
(Those who appreciate binary jokes
and those who do not.)

@DanaMLewis
Getting diagnosed with a chronic disease is like being struck by lightning.
Food, hormones, sickness, stress

Insulin, exercise, sickness, stress

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The current tools are not perfect....

Continuous Glucose Monitor (CGM)

Insulin Pump

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Manual diabetes:

1. Read data from CGM
2. Read data from pump
3. Do math about what action is needed
4. Give more/less insulin, or eat food
5. Do it again.. and again... and again...

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Leaving us often with this:

<table>
<thead>
<tr>
<th>Date</th>
<th>Breakfast</th>
<th>Lunch</th>
<th>Dinner</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Jul</td>
<td>salad</td>
<td>banana</td>
<td>hamburger,</td>
</tr>
<tr>
<td></td>
<td>frozen dinner</td>
<td></td>
<td>salad, ice cream</td>
</tr>
<tr>
<td></td>
<td>cheese &amp; crackers</td>
<td></td>
<td>steak/rice/bean's bowl</td>
</tr>
<tr>
<td>5-Jul</td>
<td>bacon &amp; eggs</td>
<td>7/8 - 4 mile run,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>chicken &amp; rice</td>
<td>transmitter died</td>
<td></td>
</tr>
<tr>
<td></td>
<td>kebab &amp; sausage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-Jul</td>
<td>banana</td>
<td>doritos</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ham/cheese</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>lettuce wrap</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>with yogurt,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>cheddar</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>steak &amp; potato</td>
<td></td>
</tr>
<tr>
<td>7-Jul</td>
<td></td>
<td>yogurt</td>
<td>bacon &amp; eggs</td>
</tr>
<tr>
<td>9-Jul</td>
<td>bacon &amp; eggs</td>
<td>tomato soup</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>cheese &amp; crackers</td>
<td></td>
</tr>
<tr>
<td>10-Jul</td>
<td>yogurt</td>
<td>chicken &amp; rice</td>
<td>fondue</td>
</tr>
</tbody>
</table>
Problems are opportunities to change things.

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If we can’t change existing devices... what if we could add *new* tools?

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Do-It-Yourself (DIY)

Building, making, or combining disparate tools into a solution that works for yourself.

Often done when no commercial solution exists; or commercial solutions are not accessible; or because commercial solutions are not good enough to meet the needs of the individual.

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From reactive to predictive: an “open loop”
We already have in our pockets the tools needed for an “artificial pancreas”.

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Components of an open source artificial pancreas

- Continuous glucose monitor
- Insulin pump

@DanaMLewis
Components of an open source artificial pancreas

1. Continuous glucose monitor
2. Computer ("controller")
3. Battery
4. Radio stick ("translator")
5. Insulin pump

(Illustration by Clint Ford for Popular Science)

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1. Read data from CGM
2. Read data from pump
3. Do math about what action is needed
4. Give more/less insulin
5. Do it again.. and again... and again...

(human doesn’t have to pay constant attention, but still checks in from time to time)

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#OpenAPS

is an open and transparent effort to make safe and effective basic Artificial Pancreas System (APS) technology widely available to reduce the burden of Type 1 diabetes.

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OpenAPS “rig”

@DanaMLewis

www.OpenAPS.org

(continuous glucose monitor)
We have multiple medical devices, but why are we so often forced to use one app per device?

Our data should be interoperable.

@DanaMLewis
(Me, anytime someone says “but you’re not a _______”.)
Not traditional..

• Engineers
• Programmers
• Scientists
• Researchers
• Rocket Scientists

But yet we are:

• Engineers
• Developers
• Scientists
• Researchers
• Inventors

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Traditional innovation

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Traditional innovation

User-driven innovation

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What if the 1% are not exceptions?

Rather, what if they are the undiscovered rule?

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What happens when we surface and share data openly so anyone – regardless of “role” or credentials – can use it to improve things?

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1. You don’t know what you can do until you try.

2. Anything is better than nothing – don’t wait for perfection.

3. Small, iterative changes are multiplicative.
#WeAreNotWaiting

Are you?

#OpenAPS  |  @DanaMLewis  |  www.DIYPS.org  |  www.OpenAPS.org
Automated Insulin Delivery
How artificial pancreas “closed loop” systems can aid you in living with diabetes

Now available!

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- PDF
- Web version

www.ArtificialPancreasBook.com

written by @DanaMLewis

(Read it? Please consider reviewing it on Amazon to help others find it!)