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Community: Harrow Digital Inclusion and Diabetes Community Club at the Harrow International Christian Centre

Topic: Diabetes and the heart: How can computational models help?

On 25 October 2024, we were invited by the Harrow Digital Inclusion and Diabetes Community Club to speak to members at one of their regular Friday morning meetings, which are held at the Harrow International Christian Centre (HICC). The speaker was Dr Marina Strocchi (Research Fellow, National Heart and Lung Institute, Imperial College London).

Background and development of the session

The session came about by an invitation from an Imperial Biomedical Research Centre (BRC) Community Partner for the Metabolic Medicine and Endocrine Imperial BRC research theme, who is on the organising committee of the Harrow Digital Inclusion and Diabetes Community Club, hosted at the HICC.

The Harrow Digital Inclusion and Diabetes Community Club is a social club and peer support group, which meets on Friday mornings at the HICC to:

- share information on topics related to type 2 diabetes
- provide support with IT skills
- run fitness classes
- socialise

Most members are aged 60+ and include individuals who are either non-diabetic, prediabetic or living with type 2 diabetes. Attendance at sessions averages between 20-25 people, depending on the time of year.

Prior to the session, Dr Marina Strocchi and Naomi Asantewa-Sechereh (Imperial Patient Experience Research Centre) had a call with a member of the organising committee of the Harrow Digital Inclusion and Diabetes Community Club to discuss which areas of Dr Strocchi's research would be of interest to the members and to finalise the session outline.

Agenda

The agenda of the session was:

- 10:00am: Arrival and refreshments
- 10:15am-11:15am: Talk and Q&A
- 11:15am: Socialise and chair-based exercise (regular Club activity)
- 12:30pm: Event close

Overview of the session

The session covered the following:

- Where is the heart located?
- What does the heart look like?
- What does the heart do?
- How does the heart work?
- How can doctors check how the heart is functioning well?
- How can doctors take medical images of the heart?
- How can we generate 3D models of the heart?
- How does diabetes affect the heart?
- What is a digital twin of the heart?
- How do we apply digital twins of the heart to research on diabetes?

Dr Strocchi brough a variety of 3D printed hearts generated from different patients for the attendees to handle and to demonstrate the different areas of the heart. A PowerPoint presentation was used for visual aids and to get key information across.

Attendees were invited to ask questions throughout the talk if anything wasn't clear. In addition, as Dr Strocchi presented, she frequently checked with attendees that they understood and to ask if any clarification was needed. Dr Strocchi stayed after the talk to speak to the attendees 1:1 and answer their questions.

Attendees

Attendees at the session included:

- 24 Harrow Digital Inclusion and Diabetes Community Club members
- 1 Imperial College London staff/researchers
- 1 Imperial Patient Experience Research Centre staff member

Session outcomes

Dr Strocchi asked the attendees questions pre- and post-talk as a quick way to assess the level of understanding and views, and if there were any changes following the talk:

Pre-talk questions:

- Have you ever taken part in research? E.g. trial, survey, focus group…
- Would you be interested to take part in research in future?
- Where is the heart?
- Do you know that diabetes can affect your heart?
- Have you ever heard about digital twins?

Only one attendee had a DNA test as part of research. Some attendees were interested in taking part in research, whereas others would be put off due to hearing about risks (e.g. allergic reaction seen in children who took part in a trial in a local hospital). All attendees knew where the heart was located. Prior to the session, four attendees were aware that diabetes can affect the heart, but no attendees had heard of digital twins.

<u>Post-talk questions</u>:

- Where is the heart?
- Do you know that diabetes can have an effect on the heart?
- Do you know what a digital twin is?
- Would you be interested in taking part in some research?
- Do you feel like you've learnt something today?

Following the session, the attendees were more aware of the effects that diabetes can have on the heart and they felt they had an increased awareness of digital twins. There were still some concerns about taking part in research, particularly at the early stages of research where something could go wrong. All attendees felt that they had learnt something.

Session feedback

At the end of the session, attendees were provided with a feedback form to provide further feedback on what they thought of the session. Of the 24 attendees, 22 attendees completed a feedback form.

They were positive about the session, for example: "*Dr Marina was clear, concise and explained very clearly*".

As shown with responses to the pre-talk questions, many attendees were not aware that diabetes could affect the heart, for example: "*I never knew that diabetes could affect the heart*" and they appreciated the information shared during the talk "*Give a better understanding of the connection between diabetes and its effects on the heart*".

Of those attendees who completed a feedback form:

- 73% rated the session as good or excellent (27% did not respond to this question).

- 100% 'Agree' or 'Strongly Agree' with the statement '*I feel more knowledgeable about the heart*'

- 95% 'Agree' or 'Strongly Agree' with the statement '*I feel more knowledgeable about the effects that diabetes can have on the heart*'

- 65% 'Agree' or 'Strongly Agree' with the statement '*I gained a basic understanding of digital twins*'

- 95% 'Agree' or 'Strongly Agree' with the statement '*I feel more confident that this type of research (such as the project presented today) is important to improve our understanding of the effects of diabetes and diabetes therapies on the heart*'

Full details of the completed feedback forms and comments can be found in **Appendix 1** and demographics of attendees can be found in **Appendix 2**.

Questions asked by attendees:

- Why are there so many leads on an electrocardiogram (ECG) test, and why do they need to attach the leads in a specific position on the body?
- Is there a standard rate at which each person's heart is supposed to beat? If so, what is it?
- Is each person's heart beat different, or is it more or less the same?
- What is a normal range – heart beats per minute?
- Why do we have blood tests? What do they actually tell us?
- As new drugs for diabetes come out, are they taking away old drugs e.g. metformin?
- How will a computer simulation relate to people in real life? How close is the simulation to the patient's own heart?
- Are you looking for patients to carry out this research who are confirmed diabetics?
- When you do research and if you find out what is wrong with that patient, do you relay it back to their GP? What do you do with that information when you find out about it?
- What does borderline diabetes mean?
- If you would like to volunteer for research, does your age matter and does it matter if you are a patient with heart disease?
- How long before your research goes out into the real world?
- How long will you get a budget to continue your research?
- For an older person with high blood pressure, why is it normal for 130/160 blood pressure measurements?
- Is heart disease hereditary or inherited?
- Wouldn't it be better to do preventative research to stop the disease happening in the first place?
- If you've been diabetic for 15 years, is it likely that you could get rid of your diabetes? Is your diabetes likely to cause heart disease?
- Why or don't they do this type of training/talks in schools?
- At this stage is it a suspicion that diabetes can cause heart disease, or it is known?
- If you have a heart condition, is diabetes is likely to make it worse?

Appendix 1: Feedback from attendees

The responses from the 22 completed feedback forms are written up below:

Q1. Overall, how would you rate the session?					
No response	Very bad	Bad	Average	Good	Excellent
6	0	0	0	6	10

Q2. Please rate the following statements: a) I feel more knowledgeable about the heart					
No response	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
0	0	0	0	8	14

b) I feel more knowledgeable about the effects that diabetes can have on the heart					
No response	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
0	1	0	0	7	14

c) I gained a basic understanding of digital twins					
No response	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1	0	0	0	11	10

d) I feel more confident that this type of research (such as the project presented today) is important to improve our understanding of the effects of diabetes and diabetes therapies on the heart					
No response	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
0	1	0	0	5	16

Q3. Do you think the information presented at today's session has helped you in any way? If yes, please let us know how. (free-text)
I believe it has given me a clearer understanding of the effect of diabetes on the heart.
By explaining and showing the examples.
Yes, made me completely understand my family's predisposition for heart problems.
Yes.
Yes.
I never knew that diabetes could affect the heart.
Yes indeed.
Explained more knowledge of how I can help to prevent heart disease.
It was well presented.

Yes. I will pay more attention regarding my health and diabetes.
My understanding of the heart functions.
I did not know that the diabetes affects the heart.
Yes.
Learning about new things like digital heart.
Help to understand how the heart works and how it affects you.
Give a better understanding of the connection between diabetes and its effects on the heart.
Very good.
Yes, it is a warning to all of us.
Definitely.
I think the information leaves me curious, need to read more.

Q4. What did you like most about the session? (free-text)
Dr Marina was clear, concise and explained very clearly.
Her prompt response to questions.
The confidence given my Marina to enable us to ask numerous questions.
The information on diabetes.
Everything.
It was explained using layman's language.
All the aspects of the presentation.
The slides and the explanation.
The way she explain herself.
The explanations.
The potential of digital twins must be funded to continue.
Everything.
Learning about diabetes.
More the heart and diabetes.
The in-depth of explanation of the heart and the arteries.
Better knowledge of the heart function.
Well explained.
We could ask questions if we didn't understand.
The models you brought of the heart and explained it.
All.
I liked the information about the digital twins.

Q5. What could be done better next time? (free-text)
More information on what the patient of the research will be told.
Just keep on trying.
Maybe copies of the slides for future queries and reference.
More information would help.
Talk about blood pressure.
Nothing.

Nothing.
Beautifully presented and all questions answered. Thank you.
We need more explanation.
Good, happy.
None.
I think parents are to be taught as soon as a baby is born.
Small film of heart.

Q6. Please add any thoughts/comments or suggestions about the proposed project presented at today's session below: (free-text)
I believe preventative research and information would benefit those having pre-diabetic conditions and better monitoring of pre-diabetics would cause less people becoming fully diabetic.
More effort to prevent diabetes. More education to schools and colleges on the prevention of diabetes.
Please come again.
Loved it!!
Good excellent.
Small film of heart.
Ask for more funding.

Appendix 2: Attendee demographics

The demographics of attendees taken from the completed feedback forms (n=22/24) are reported below:

Age groups (in years)

Characteristics	Number	%
66 – 75	12	55
76 – 85	5	23
86+	3	14
Prefer not to say	2	9

Ethnicity (self-reported)

Characteristic	Number	%
African	2	9
African - Caribbean	1	5
Asian	1	5
Black - African	1	5
Black - Caribbean	1	5
British	3	14
British - Indian	1	5
Caribbean	1	5
Cypriot/British	1	5
Indian	1	5
White English	1	5
Prefer not to say	8	36