Effectiveness of a Diabetes Program based on eHealth on capacity building and quality of care in type 2 diabetes: a pragmatic quasi-experimental study.

Daniela Moraes Morelli, RN MSc.

Institute for Clinical Effectiveness and Health Policy (IECS)
Buenos Aires, Argentina
## DIABETES BURDENS

- **10.5%** adults around the world are currently living with diabetes.
- **4 in 5** people with diabetes live in low-middle income countries (LMIC).
- **44%** are undiagnosed.
- **6.7 million** adults died to diabetes or its complications in 2021.
- **US$ 966 billion** expenditure in 2021.

### Estimated Prevalence

<table>
<thead>
<tr>
<th>Region</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>South-Central America</td>
<td>9.4% (IDF, 2021)</td>
</tr>
<tr>
<td>Argentina</td>
<td>12.7% (ENFR, 2020)</td>
</tr>
</tbody>
</table>

### WDF 14.937 Diabetes Program Corrientes

Developed by researchers from the Center of Excellence in Cardiovascular Health for South America, from the **IECS** in Buenos Aires (Argentina), has the support of Diabetes World Foundation and Government of Corrientes.
To strengthen primary care clinics to provide high quality of diabetes care and improve coverage in patients living in underserved areas in the province of Corrientes, Argentina.

1. **Generate capacity building** in the use of Clinical Practice Guidelines and educational interventions for primary health care teams.

2. **Implement a Diabetes Registry and an e-health strategy** to improve attendance and follow-up of patients in the health centers.

Quasi-experimental pre-post uncontrolled study

Qualitative data collection

19 PCCs included

- to be located in poor urban areas,
- have at least 800 outpatient visits/month;
- employed community health workers,
- to provide free chronic medications,
- have an internet connection.

- confirmed diagnosis of T2DM,
- ≥ 18 years and access to mobile phones,
- living less than 10 km from the PCC,
- signed the informed consent.

* Pregnant women at the time of screening and bedridden people were excluded.
Training and Education

Face-to-Face Training
Online Course
Workshops and Individual Counseling

- **59** Physicians
- **193** Nurses
- **231** CHWs
- **135** Educators

- **32 PCCs Workshops**
  - 514 Patients - 54 Peers

- **Individual Counseling**
  - 1,714 Patients
Resources are important to the quality of care.
eHealth Clinical System
Platform Web Diabetes
Server Web
App Sana
SMS Gateway

Diabetes Registry
Variables included from the registry used to create the algorithms used for the clinical decision support system

Example of an algorithm

Web based platform to send SMS

Example of an educational message
Outreach Visits
Audit
Retraining
Quality of care
## Patient Enrollment and Follow-up

### Baseline Visit (N=1065) vs Follow-up 12 months (N=776) vs Follow-up 24 months (N=565) vs p*

<table>
<thead>
<tr>
<th>Process</th>
<th>Baseline Visit</th>
<th>Follow-up 12 months</th>
<th>Follow-up 24 months</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n (%)</strong></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td><strong>HbA1c testing</strong></td>
<td>216 (20.28%)</td>
<td>268 (34.53%)</td>
<td>364 (64.42%)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Cholesterol LDL testing</strong></td>
<td>387 (36.34%)</td>
<td>229 (29.51%)</td>
<td>407 (72.04%)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Triglycerides testing</strong></td>
<td>332 (31.17%)</td>
<td>205 (26.41%)</td>
<td>363 (64.24%)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Creatinine testing</strong></td>
<td>102 (9.57%)</td>
<td>365 (34.27%)</td>
<td>496 (46.57%)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Blood pressure check</strong></td>
<td>1055 (99.06%)</td>
<td>776 (100%)</td>
<td>538 (95.22%)</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Monofilament - foot exam performed</strong></td>
<td>662 (62.15%)</td>
<td>666 (85.82%)</td>
<td>493 (87.25%)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Eye exam performed</strong></td>
<td>230 (21.59%)</td>
<td>278 (35.82%)</td>
<td>186 (32.92%)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Any treatment for diabetes</strong></td>
<td>887 (83.28%)</td>
<td>722 (93.04%)</td>
<td>553 (97.87%)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Hypertensive# on antihypertensive medication</strong></td>
<td>561/648 (86.57%)</td>
<td>529/617 (85.74%)</td>
<td>407/464 (87.72%)</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Age &gt;= 40 &amp; &lt;= 75 years on statins</strong></td>
<td>162/911 (17.78%)</td>
<td>194/691 (28.08%)</td>
<td>158/507 (31.16%)</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

### Intermediate Results

| **Poor metabolic control (HbA1c >= 8%)** | 109/216 (50.46%) | 121/268 (45.14%) | 177/364 (48.62%) | NS     |
| **Uncontrolled blood pressure (>=140/90 mmHg)** | 499/1055 (47.25%) | 325/776 (41.88%) | 166/538 (30.85%) | <0.01  |

*p significant <0.05, NS= non-significant, N/A=not applicable; chi2 test for trends;
$oral antidiabetics drugs, insulin or both
eHealth is a facilitator in the management of care.

The register extends the length of time of the visit.

"I use everything on paper, because to use the Tablet I need to be calm, If not I get angry and I touch anything ..." (nurse, 54)

".. They are super! because it agree with the guides. I use the level of risk according to the color, so I know when I have to follow the patient...." (physician, 57)

SMS are a positive influence for patients.

Facilitates the patient’s learning processes.

Promotes the dissemination of the acquired.

Contribution to Psychosocial Support.

“ I feel more accompanied, I feel calmer. At least, someone who always remembers me because when you receive something in your cellphone, in your phone, you feel more comfortable, more peaceful.” [Woman, 63 years]

• Antidiabetic medication shortage.
• Access to labs and specialist.
• Internet signal instability.
• Access (Floods).
What the study left...

- Health team strengthened.
- Installed capacity to diabetes care.
- Transferred technology.
- Extended the program to 50 new PCCs.
- Media coverage about diabetes.
- 2 Papers published and 1 under review.
- And great team work ...

Despite numbers, it's always about people!