The relationships between structure, process and outcome as a measure of quality of care in the integrated chronic disease management model in rural South Africa

INDEPTH Scientific Conference, Addis Ababa, Ethiopia
November 11\textsuperscript{th} -13\textsuperscript{th}, 2015

*Soter Ameh
Francesc X. Gómez-Olivé
Stephen Tollman
Kathleen Kahn
Kerstin Klipstein-Grobusch
Outline

- Background
- Theoretical framework
- Study aim and objectives
- Methods
- Results
- Conclusions
Background

- Chronic diseases expand beyond traditional NCDs to include HIV/AIDS

- In 2012, NCDs accounted for 38 million of the world’s 57 million deaths
  - Three-quarter of these 38 million deaths occurred in LMICs

- Mortality due to NCDs estimated to increase to 55 million by 2030
  - Africa will have the greatest increase

- In 2012, HIV accounted for 1.5 million (2.7%) global deaths
  - Ranking the 6th global cause of death
Background

- Dual disease burden in South Africa - stalled epidemiological transition
  - NCDs e.g. hypertension
  - Chronic communicable diseases (e.g. HIV and TB)

- NCDs accounted for 43% of all deaths in S/Africa in 2014

- HIV prevalence in S/Africa estimated at 10% in 2014
  - One of the highest in Africa
Evidence of integrating HIV/AIDS, hypertension and diabetes services in Cambodia:

- Improved quality of care

UNAIDS recommends integration of HIV/AIDS and NCD services to:

- Leverage HIV programme for NCDs
- Improve quality of chronic disease care
- Minimise HIV-related stigma
- Improve patients’ health outcomes
Background

S/Africa’s response to the dual burden of HIV/AIDS and NCDs
- The National Department of Health introduced the ICDM model
- Pilot of the model was initiated in June 2011 in three Provinces

The ICDM model:
- Component of PHC re-engineering; nurse-led
- “One-stop-shop” for management of chronic diseases
- Expected to enhance quality of care
Components of the ICDM model

- Facility re-organisation:
  - Supply of critical medicines and equipment
  - Prepacking of medicines
  - Referral
  - Defaulter tracing
  - Appointment system

- Community-oriented chronic disease care
  - Outreach team serves a catchment population
  - Responsible for 6000 persons, 1500 households
  - Target: manage 80% of chronic diseases
  - Composition of the PHC outreach team
    - A professional nurse, three staff nurses and six CHWs

- Health promotion and screening in the population
Statement of the problem

- S/Africa’s health care system has yet to adapt to the long-term continuity of chronic care
- Chronic disease care is fragmented within the public health system in S/Africa
- Poor management of NCDs
- Dearth of information on the quality of care in the ICDM model
Study justification

- Better understand how the ICDM model works
- Provide evidence of quality of care in the ICDM model
Research aim and objectives

Study aim:
- To evaluate quality of care in the ICDM model

Study objectives:
- To assess satisfaction of patients and operational managers with the dimensions of care
- To assess the relationships between structure, process and outcome constructs as a measure of quality of care in the ICDM model using patient satisfaction scores
Study setting

115,000 people; in 60,000 h/holds
2 health Centers, 6 fixed clinics
2 hospitals  25 – 60 km away
Methodology

- **Study setting**
  - Bushbuckridge sub-district (38 PHC facilities: 17 ICDM model pilot facilities)
    - Seven ICDM model pilot facilities in the Agincourt HDSS

- **Study design**: Cross-sectional analytical

- **Study population**: Patients on treatment for the markers of chronic diseases in the study area
Theoretical framework

Donabedian’s theory used to evaluate the quality of care in the ICDM model

Avedis Donabedian’s theory for evaluating quality of health care

- Relationships between structure, process and outcome constructs
  - Structure: Organizational resources needed to provide care e.g. drug supply
  - Process: Things done to and for the patient e.g. defaulter tracing
  - Outcome: Desired result of health care e.g. waiting time
Hypothesised pathways

A: Unidirectional pathway

B: Mediation pathway

C: Non-recursive (reciprocal) pathway

Figure 1: Pathways used to operationalize Donabedian’s theory in the ICDM model
Figure 1: The dimensions of quality of care in the ICDM model

*Dimensions in red colour indicate the priority areas of the ICDM model*
Methodology

- **Sample size determination:**
  - Subjects-to-variable ratio (10:1) for studies using confirmatory factor analysis
  - 17 subjects for 22 variables (435 patients, adjusted for 10% non-response)

- **Three-step sampling technique**
  - Proportionate sampling to recruit patients in each facility
  - Patients in each facility stratified by HIV/AIDS, hypertension and diabetes
  - Systematic sampling used to recruit patients in each facility

- **Inclusion criteria:** Patients on treatment since January 2011, age ≥ 18 years

- **Exclusion criteria:** Minors (<18 years) and old people with diminished capacity for comprehension

- Operational managers of the seven facilities were interviewed
Methodology

- Study instrument: Patient satisfaction questionnaire (PSQ-18)
  - Has multiple dimensions of care
  - Scored on a five-point Likert scale (strongly agree to strongly disagree)

- Operationalization of Donabedian’s theory:
  - A priori identification of variables intended for SPO constructs
  - Respondents satisfied if the total relative frequency was ≥ 50% for “strongly agree” and “agree”
  - Reliability of adapted PSQ was tested using Cronbach’s alpha coefficient
  - Confirmatory factor analysis was (factor loadings ≥ 0.30)
  - Structural equation modelling was used to fit the specified pathways.

- Model fit indices included:
  - Root Mean Squared Error of Approximation (RMSEA ≤ 0.06 - good fit);
  - Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) (values > 0.90 - good fit);
  - Coefficient of Determination (CD close to 1 - good fit)
  - \( \chi^2 \) p-value > 0.05 - good fit (not applicable if sample size > 400)

- Stata 12 was used for statistical analysis (5% level of significance)
# Results

Table 1: Socio-demographic characteristics of the study participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (N=435)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-29</td>
<td>23</td>
<td>5.3</td>
</tr>
<tr>
<td>30-39</td>
<td>69</td>
<td>15.8</td>
</tr>
<tr>
<td>40-49</td>
<td>68</td>
<td>15.6</td>
</tr>
<tr>
<td>50-59</td>
<td>88</td>
<td>20.3</td>
</tr>
<tr>
<td>60-80</td>
<td>187</td>
<td>43.0</td>
</tr>
<tr>
<td>Mean ± SD (55 ± 16.5); Median = 56</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>354</td>
<td>81.4</td>
</tr>
<tr>
<td>Male</td>
<td>81</td>
<td>18.6</td>
</tr>
<tr>
<td><strong>Education (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>164</td>
<td>37.6</td>
</tr>
<tr>
<td>≤ 6</td>
<td>217</td>
<td>49.9</td>
</tr>
<tr>
<td>&gt; 6</td>
<td>54</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Type of grant</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>91</td>
<td>20.9</td>
</tr>
<tr>
<td>Old age</td>
<td>299</td>
<td>68.7</td>
</tr>
<tr>
<td>Disability</td>
<td>44</td>
<td>10.1</td>
</tr>
<tr>
<td>HIV</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not presently working</td>
<td>431</td>
<td>99.0</td>
</tr>
<tr>
<td>Presently working</td>
<td>4</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Nationality of origin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South African</td>
<td>415</td>
<td>95.5</td>
</tr>
<tr>
<td>Mozambican</td>
<td>20</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Chronic disease status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>231</td>
<td>53.1</td>
</tr>
<tr>
<td>HIV</td>
<td>151</td>
<td>34.7</td>
</tr>
<tr>
<td>Multiple conditions</td>
<td>49</td>
<td>11.3</td>
</tr>
<tr>
<td>Diabetes</td>
<td>4</td>
<td>0.9</td>
</tr>
</tbody>
</table>
Results

Satisfaction with structure-related dimensions of quality of care

- **Accessibility of care**: 96.3% (Patients) vs. 85.7% (Operational managers)
- **Supply of critical drugs** (*): 92.9% (Patients) vs. 100% (Operational managers)
- **Availability of equipment**: † 97.0% (Patients) vs. 57.2% (Operational managers)

* Priority dimensions of care in the ICDM model
† Statistically significant differences in the satisfaction scores of the patients and operational managers

Figure 4: Satisfaction scores of the patients and operational managers with structure-related dimensions of care in the ICDM model
Results

Figure 5: Satisfaction scores of the patients and operational managers with process-related dimensions of care in the ICDM model

*Priority dimensions of care in the ICDM model
†Statistically significant differences in the satisfaction scores of the patients and operational managers
Results

Satisfaction with outcome-related dimensions of quality of care

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Patients</th>
<th>Operational Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses' competencies</td>
<td>87.6</td>
<td>85.7</td>
</tr>
<tr>
<td>Patient waiting time*</td>
<td>16.6</td>
<td>42.9</td>
</tr>
<tr>
<td>Confidence in nurses</td>
<td>85.5</td>
<td>85.5</td>
</tr>
<tr>
<td>Coherent care*</td>
<td>97.4</td>
<td>85.7</td>
</tr>
</tbody>
</table>

*Priority dimensions of care in the ICDM model

Figure 6: Satisfaction scores of the patients and operational managers with outcome-related dimensions of care in the ICDM model
Table 2: The result of the goodness of fit of the specified pathways

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Specified pathways</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unidirectional</td>
</tr>
<tr>
<td>χ² test p value &gt; 0.05*</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>RMSEA value ≤ 0.06</td>
<td>0.064</td>
</tr>
<tr>
<td></td>
<td>(90% CI - 0.052-0.077)</td>
</tr>
<tr>
<td>CFI ≥ 0.90</td>
<td>0.915 ✓</td>
</tr>
<tr>
<td>TLI ≥ 0.90</td>
<td>0.892</td>
</tr>
<tr>
<td>CD close to 1.00</td>
<td>0.911 ✓</td>
</tr>
<tr>
<td>(perfect fit is preferred if CD value=1.00)</td>
<td></td>
</tr>
<tr>
<td>Ranking</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

*χ² test p value was not used as a criterion for judging model fit – sample size >400
Results

RMSEA = 0.058 (90% CI: 0.045 - 0.070); CFI = 0.931; TLI = 0.913; CD=1.000

χ² [52] = 127, p < 0.001

Composite reliability: structure = 0.790; process = 0.702; outcome = 0.600

Figure 7: Goodness-of-fit, reliability and correlation assessments
Operational managers reported satisfaction with 16 dimensions of care
Patients reported satisfaction with 14 dimensions of care
Operational managers and patients were dissatisfied with patient waiting time
Of the seven priority areas, availability of medicines and coherent care were significantly associated with good quality of care
Strengthen services in:
- Referral
- Defaulter tracing
- Prepacking of medicines
- Appointments
- Patient waiting time
Structure correlated with process and outcome. Independent of structure, process correlated with outcome
Large scale study needed in PHC facilities in semi-urban and urban areas
Acknowledgments

- God Almighty
- Co-investigators
- Family and friends
- Agincourt Unit staff
Funders
Thank you for listening


References


Ware JE, Snyder MK and Wright WR. Development and validation of scales to measure patient satisfaction with health care services: Volume I of a final report part A: review of literature, overview of methods and results regarding construction of scales.