The Egyptian National HCV Control Program
Treatment outcome in the Era of DAAs

Wahid Doss, MD
Professor of Endemic Medicine
Cairo University
Total Viremic HCV Infections

Countries Responsible for 80% of Global Infections

HCV burden in Egypt is the highest in the world – a unique challenge

- HCV seroprevalence in Egypt in 2015 estimated to be 4.7% overall; 15-59 years 7%
  - National epidemic with social, economic and political implications

- Estimates of 150,000–200,000 patients newly infected per year
Current Disease Burden

- Estimates based on the 2015 Demographic and Health Survey (EDHS)
Egyptian Government tackling HCV problem

Until 2006 Egypt did not have a comprehensive national program for control of HCV:

- No large nationwide survey for the disease, accurate prevalence data unavailable
- Government did not cover HCV therapy
- No national guidelines for treatment
- Limited infection control program
National Committee for Control of Viral Hepatitis Established in 2006

### Targets

- National Survey & Burden of Disease
- Develop a National Strategy
- Treatment Program
- Prevention
  - Awareness
  - Infection control
- Clinical Research
- Management of advanced liver disease (ALD)

### Outcome

- HCV testing integrated in DHS survey 2008 and 2015
- National Strategy: 2008
  Plan of Action: 2014-2018
- Successful treatment program
- IC remains fragmented
- Research ongoing
- Management of ALD
Developments 2011 through 2014

Treatment

• Clinical trials with DAAs (GT4)
• Negotiations & registration of Sofosbuvir 2014
• Web-based national patient enrolment for DAA treatment (>1.2 million so far)
• First patient started treatment Oct 16th
• Other DAAs introduced in 2015

Prevention

• Action plan launched Oct 2014
• Components (Surveillance, IC, Blood safety, Vaccination, IEC, Screening...
Governorates Treatment centers in Egypt (51)
In the villages of the Nile Delta, half of all men older than 50 are infected with hepatitis C. Credit David Degner for The New York Times
Patients register on website portal www.nccvh.org.eg

Appointment (24 hrs later) & list of required tests

Blood tests & Abdominal US

Management review (medical and administrative) for approval

Data Entry from centers (NNTC)

Evaluation clinic & Enrolment

Patient gets approval for treatment and PCR support

Patient starts treatment

FUP data in NNTC
Web-Based Registration System
(Sept 2014)

- Registry data first 4 days
  Sep 28th 2015 (n=257 341)
- April ‘06 1,297,251 registered
- Males 66.5%
- 78.5% Naïve
- 88% Government support (rest cash)
Prices of Sofosbuvir
list price for 12 weeks of treatment, per patient US$

<table>
<thead>
<tr>
<th>Country</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S</td>
<td>90,000$</td>
</tr>
<tr>
<td>Poland</td>
<td>80,000$</td>
</tr>
<tr>
<td>Ger</td>
<td>70,000$</td>
</tr>
<tr>
<td>Norw</td>
<td>60,000$</td>
</tr>
<tr>
<td>Cana</td>
<td>50,000$</td>
</tr>
<tr>
<td>U.K</td>
<td>40,000$</td>
</tr>
<tr>
<td>Brazil</td>
<td>30,000$</td>
</tr>
</tbody>
</table>

Egypt: 1,000$
Mongolia: 800$
India: 600$
Production: 200$

Courtesy of Stefan Wiktor, Viral Hepatitis team leader WHO
Cost of HCV Drugs and Generics

Costs of new drugs for hepatitis C per person, 12-week course

New generation drugs for HCV

<table>
<thead>
<tr>
<th>Drug</th>
<th>Cost in USA</th>
<th>Minimum production price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sofosbuvir</td>
<td>$84,000</td>
<td>$68–$136</td>
</tr>
<tr>
<td>Simeprevir</td>
<td>$66,000</td>
<td>$130–$270</td>
</tr>
</tbody>
</table>

Hill A, Cooke G. Science 2014; 345(6193):141-142
Correlation between HCV drug prices and gross national income - LMIC countries

Estimated Number of People Treated with Sofosbuvir or Sof/Led by Region

Source: UNITAID. Hepatitis C Medicines Technology and Market Landscape – update (November 2015)
http://www.unitaid.eu/en/resources/publications/technical-reports#hep
Estimated chronic HCV prevalence, diagnosis and treatment rates in 2013

Most LMIC

Dore J al. J Viral Hep (2014),
Economic Burden

- HCV infection is a huge economic burden in Egypt
  - Direct healthcare cost US$ 670 Mln
  - Indirect economic impact of disability US$ 3.7 Bln
  - Close to 1.8% of the GDP (Similar to DM and CVD cost in the US)
  - Intangible costs to society and families not assessed

- Treatment of large numbers of patients with effective therapy is the best option for control
  - Curing a patient saves ~ US$ 10,000 for the next 15 years
  - Preventing a case saves ~ US$ 20,000 for the next 40 years
  - Without active prevention there will be 1Mln more cases in 2030

• Scaled up nationwide treatment centers from 46 to 51 in all governorates. Should reach 100 by end 2016
• Over 2000 HCWs trained in specialised centers
• Capacity building for data management
• Update treatment guidelines regularly
• Increased number treated annually from 50K to 200K; should reach 400-500K by 2017
• Fast track registration of all approved DAAs- special pricing for NCCVH
• Support local production after quality assurance
• Planned stepwise screening program
### Chronology of Treatment Protocols Implemented by the National Program

<table>
<thead>
<tr>
<th>Date</th>
<th>Implemented Protocol</th>
<th>Inclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-2014</td>
<td>PegIFN-RBV</td>
<td>F1-F3 patients</td>
</tr>
<tr>
<td>October 2014-May 2015</td>
<td>Sofosbuvir-PegIFN-RBV</td>
<td>F3,F4 IFN tolerant</td>
</tr>
<tr>
<td></td>
<td>Sofosbuvir-RBV</td>
<td>F3,F4 IFN intolerant up to Child B 8 (down to 7)</td>
</tr>
<tr>
<td>May 2015-November 2015</td>
<td>Sofosbuvir-PegIFN-RBV</td>
<td>F0-F4, normal synthetic function</td>
</tr>
<tr>
<td></td>
<td>Sofosbuvir-Simeprevir</td>
<td>F0-F4, impaired synthetic function up to Child A6</td>
</tr>
<tr>
<td>November 2015</td>
<td>IFN-free regimen. Two DAAs ± RBV</td>
<td>F0-F4, impaired synthetic function up to B7. Higher Child in special centers</td>
</tr>
</tbody>
</table>
National HCV Treatment Program

April 2016
HCV Cascade in National Treatment Program in Egypt

<table>
<thead>
<tr>
<th>Stage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered</td>
<td>129725</td>
</tr>
<tr>
<td>Attended 1st visit</td>
<td>507551</td>
</tr>
<tr>
<td>Submitted request</td>
<td>337043</td>
</tr>
<tr>
<td>Approved treatment</td>
<td>215637</td>
</tr>
<tr>
<td>Started treatment</td>
<td>205138</td>
</tr>
<tr>
<td>Pending/still</td>
<td>10499</td>
</tr>
</tbody>
</table>

The diagram shows the number of patients at each stage of the HCV cascade program in Egypt.
Characteristics of patients submitted for treatment (n=277,021)

Gender:
- Male, 153,541
- Female, 123,480

Age groups:
- 18:< 12
- 30-31: 17,965
- 40-41: 33,995
- 50-51: 74,419
- 60-61: 106,287
- 70-61: 43,288
- 70:< 1,055
Treatment cost: who is paying?

Government  83%
Health Insurance  9%
Private  8%
## Treatment protocols among enrolled patients (n=205138)

<table>
<thead>
<tr>
<th>Protocol</th>
<th>No of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFN/SOF/RBV</td>
<td>41056</td>
</tr>
<tr>
<td>SOF/RBV</td>
<td>24178</td>
</tr>
<tr>
<td>SOF/SIM</td>
<td>42821</td>
</tr>
<tr>
<td>SOF/DAC</td>
<td>50335</td>
</tr>
<tr>
<td>SOF/DAC/RBV</td>
<td>46748</td>
</tr>
</tbody>
</table>
Real-Life Results of the National Treatment Program in Egypt (April 2016)

• Till January 2016, 277,000 patients have started treatment
• Data available at 12 weeks follow-up after end of therapy for 16,871 patients
Real-Life Results of the National Treatment Program in Egypt (January 2016)

Triple therapy (SOF-PEG-RBV 12 wks)

Week 12
- Positive PCR: 238
- Negative PCR: 8,368

Week 12
- Positive PCR: 8,606
- Negative PCR: 8,368

End of Treatment
- RNA-ve: 97%
- On Treatment Failure: 3%

Week 24
- SVR: 93%
- Relapse: 4%

SVR: 93%

On Treatment Failure: 3%

Relapse: 4%
Real-Life Results of the National Treatment Program in Egypt (January 2016)

Dual therapy (SOF-RBV 24 wks)

Week 24
N=5,580

- Positive RNA: 112
- Negative RNA: 5,468

End of Treatment
- RNA-ve: 98%
- On Treatment Failure: 2%

Week 36

- Relapse: 21%
- SVR: 77%

SVR 77%
Relapse 21%

On Treatment Failure 0%
Real-Life Results of the National Treatment Program in Egypt (January 2016)

SIM-SOF (+-RBV, 12 or 24 wks)

Week 12 N=2,685

Positive RNA 96

Negative RNA 2,589

Week 24

End of Treatment

RNA -ve

On Treatment

96.5%

Week 36

Relapse 1.5%

39

SVR 95%

2,550

SVR

95%

3.5%

On Treatment Failure

Relapse 1.5%

1.5%
Challenges

• Generics:
  - Quality assurance
  - Voluntary licensing
  - Prequalification

• Lack of legislations

• Political competing priorities

• Lack of patient support groups

• Tailored protocols

  What suits one customer might not suit the next

• Access
  - Remote areas
  - Shorter duration & less visits
  - Children

• Screening
  - Rapid tests?
  - False negatives?
  - Repeat Testing?

• Quality Assurance and monitoring

• Stigma
  - Adults
  - Children

“It’s your office. They want to know if you can stay home a few more days.”
Constraints

• Fragmentation of health care delivery system
  – Different health sectors (MoHP; MoHE; HIO; private; military; police and others…)
  – poor coordination
  – However, multi-sectoral VH action plan.
• Financial constraints (no specified budget for prevention).
• Address lessons & gaps for strengthening of treatment program (only 45% report SVR, data incomplete)
Combining “CasP” and “PasP”

Total Infected Cases (Viremic) - Egypt

<table>
<thead>
<tr>
<th>Scenario</th>
<th>2014</th>
<th>2030</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Case</td>
<td>6,000,000</td>
<td>4,420,000</td>
<td>-26%</td>
</tr>
<tr>
<td>Increased treatment &amp; SVR, reduce incidence</td>
<td>6,000,000</td>
<td>285,000</td>
<td>-95%</td>
</tr>
<tr>
<td>Increased treatment &amp; SVR, without incidence reduction</td>
<td>6,000,000</td>
<td>1,250,000</td>
<td>-79%</td>
</tr>
</tbody>
</table>

Razavi et al, JVH, 2014
Waked et al, AJG, 2014
HCV Epidemic

- Prevention
  - Needle exchange programs
  - Safe medical practices
  - Safe blood supply
  - Vaccine?

- Screening/diagnosis

- Treatment efficacy
  - Simple, highly effective, well-tolerated

- Treatment implementation
  - Funding, advocacy, infrastructure, public policy

HCV Eradication