eHealth for Multidrug-Resistant Tuberculosis Management

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Multidrug-Resistant Tuberculosis (MDR-TB)

involves resistance to the two most powerful anti-TB drugs, isoniazid and rifampicin, in addition to resistance to any of the fluoroquinolones (such as ofloxacin or moxifloxacin) and to at least one of three injectable second-line drugs (amikacin, capreomycin or kanamycin)

Extensively drug-resistant (XDR-TB) - is a form of TB which is resistant to at least four of the core anti-TB drugs
WHO about X/MDR-TB in the world

- 650,000 MDR-TB cases in total
- 450,000 new (incident) MDR-TB cases in the world in 2012
- 170,000 MDR-TB deaths are estimated to have occurred in 2012
- 3.6% of new tuberculosis and 20% previously cared patients have MDR-TB
- 170,000 MDR-TB deaths are estimated to have occurred in 2012-2013
- in 2013 general funding for MDR-TB is reached to USD 1 billion
- 30-40% cases linked with HIV/AIDS
Reasons

- inadequate clinical care or drug management
- non-complete course of treatment
- infection from patient with X/MDR-TB
Care and Management Challenges

- suspicions about resistance have to be backgrounded
- full treatment takes 18 months at least
- any interruptions and delays are critically dangerous
- all decisions can be made only by special commission
- typical patients suffer much harder
Special Medical Commission (SMC)

- “X/MDR-TB consillium”
- confirmation of a diagnosis (presence and type of a resistance)
- protocol and medications prescription
- side-effects and complications control and consultations
- treatment monitoring every 2 months
Special Medical Commission (SMC)
unsecured original paper
Special Medical Commission (SMC)  
“one for all”
Special Medical Commission (SMC) 

**time delays**

WAITING FOR:

- primary decision of a doctor
- documents submission for the first CMS meeting and diagnosis confirmation
- documents back
- in case of side-effects and complications – waiting for the next chance of CMS meeting
- documents submission for the regular CMS
- etc....
Special Medical Commission (SMC) "usual way"

Delayed and unsecured transportation of all original medical documents and X-rays to the commission’s head office (distance between hospitals 40–150 km)

Analysis of clinical cases with presentation of the patients by a casual medical practitioner

Final decision making, paper documentation
LET’S CHANGE THE REALITY!
Scientific background

• Work-processes analysis (dynamic diagrams)
• Outcomes analysis (Ishikawa chart)
• Users prepareness (questionnaire)

Aims & Strategy
Aims

• Time delays elimination
• Secured electronic documents management
• Personal data safety
• Better infection control
• Better clinical presentations
• Improved logistics
Strategy of eHealth platform implementation

Aims - Infrastructure
- Scientific background
- eHealth - eManagement platform
- Secured and functional infrastructure
- Local legislation

Users Learning
- Step-by-step program
- Lectures
- Skills
- Problems analysis

Introduction - Monitoring
- Installations
- Official opening
- Guided sessions
- Efficiency control
The eHealth platform was created with funding support from the Rinat Akhmetov Foundation for Development of Ukraine

www.fdu.org.ua/en
eHealth-eManagement Platform

- Closed high-speed network
- Electronic Health Records (EHR) with processes automation and teleradiology
- Video-conferences
- Internal and External Integration
Donetsk:
Regional TB Hospital – office of CMS

Donetsk National Medical University

Cities/Towns:
TH Hospitals
(local centers of TB and X/MDR-TB care)

Donetsk region
(largest in Ukraine):
- 26,517 square km
- 4.4 million inhabitants
- 164.41 people/square km
- 20% of national GDP
- more than 100 coal mines
- more than 30 heavy industry plants
Internal and External Integration

Web-portal of the Platform
www.itub.dn.ua

National Tuberculosis eRegistry
Electronic Health Records with processes automation

http://www.a2.dn.ua

Business process automation - strategy a business uses to automate processes in order to contain costs. It consists of integrating applications, restructuring labor resources and using software applications throughout the organization.
Algorithmization of the process

Key players and their roles and tasks identification

Documents route standardization

From “data bank” to “data process”
Clinical and other data submission

Primary checking

Approved

Yes *

Advisers and radiologist checking

Yes *

Approved

SMC meeting via videoconference

Conclusion

* - email alert

Process End
Электронный МЛУ-консилиум Остановим туберкулез в Украине

Дата создания: 12.11.2013 11:31:45

Пациент: М. Александр Анатольевич

Направление: ◆ сделалан.pdf
Направление на областной консилиум

Карта ТБ 01-МР ТБ:
◆ ТБ-01 (1).jpg
◆ ТБ-01 (2).jpg
◆ ТБ-01 (3).jpg
◆ ТБ-01 (4).jpg
◆ ТБ-01 (5).jpg

Карта пациента

Рентген-архив:
◆ Рентген.jpg
Файлы рентгеновских снимков

* Заключение:
загрузить файл...
Введите заключение

Подготовил: В.

Примечание: К лечению привержен!

* Технический сбой:

* Расхождение диагноза:

* Расхождение
радиологического описания:

* Цель
направления:

* Вывод:

ДОБАВИТЬ КОММЕНТАРИЙ

КОММЕНТАРИИ К ПРОЦЕССУ

ЗАВЕРШЕНИЕ РАБОТЫ

Консилиум завершен

УТОЧНИТЬ ДАННЫЕ

Причина отклонения

Отклонить

ПРОТОКОЛ ВЫПОЛНЕНИЯ

12.11.2013
11:38:21

Роль: Инициатор
Кто: 
Результирующий: Процесс запущен

ИНФОРМАЦИЯ О ПРОЦЕССЕ

Код процесса: 19
Состояние: Выполняется
Владелец: V
Создан: 12.11.2013 11:31:45
Изменен: 12.11.2013 11:38:21
eManagement

- electronic data work-flow
- safety and confidentiality
- documents control
- tasks monitoring control
eWorks Videoconference

www.e-works.com
www.ntel.ru

• desk-top
• easy-to-use
• DICOM-support
Teleradiology

- via EHR (jpeg)
- via EHR (DICOM)
- via VC (jpeg) demonstration
- via VC (DICOM) diagnosis
Official opening
4 October 2013
04.10.2013-01.04.2014
1023 telemedicine SMC’s meetings
1023

17-90 years
39.9±10.4
mode/median - 38

2-75 years
36.8±13.5
mode/median - 28/34

72.5%

27.5%
Mariupol 40%
Kramatorsk 19%
Shakhtarsk 15%
Gorlovka 26%

DONETSK

Town – 82,4%
Rural - 17,6%

82,3% patients are from places at distance more than 50 km (50-140 km)
HIV/AIDS - 30%

Additional chronic diseases - 54%

Alcohol/drug addicted – 12%
<table>
<thead>
<tr>
<th>WHO’s TYPICAL PATIENT WITH X/MDR-TB</th>
<th>TARGET-PATIENT OF ANTITUBERCULOSIS EHEALTH PLATFORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Male</td>
<td>• Male - 72,5%</td>
</tr>
<tr>
<td>• 40-42 years old</td>
<td>• 38-39 years old</td>
</tr>
<tr>
<td>• Living in rural area</td>
<td>• Living in rural area - 17,6/82,3%</td>
</tr>
<tr>
<td>• Workless</td>
<td>• Workless /Homeless – 57%</td>
</tr>
<tr>
<td>• Single</td>
<td>• Drinking/drugs - 12%</td>
</tr>
<tr>
<td>• Smoking/drinking</td>
<td>• Chronic pathology (heart, lungs, gastrointestinal) - 54%</td>
</tr>
<tr>
<td>• Chronic pathology (heart, lungs, gastrointestinal)</td>
<td>• Former prisoner – 3,1%</td>
</tr>
<tr>
<td>• Former prisoner</td>
<td></td>
</tr>
</tbody>
</table>
Reasons for telemedicine SMC’s meetings, %

- Primary – 26.1%
- First phase monitoring – 42.3%
- Second phase monitoring – 22.5%
- Outcome – 7.3%
- Other – 1.8%
Performance Acceptability Ratio

[Starpace Systems Report, 1977]

Critical PAR
\[(1 - \text{critical fails/ total sessions}) \times 100\%\]

Non-critical PAR
\[(1 - \text{non-critical fails/ total sessions}) \times 100\%\]

System acceptability (teleradiology) (SA)
\[
\frac{\text{number of readable x-rays received}}{\text{total number of transmitted x-rays}}
\]

Diagnosis changing/correcting (DS)
\[
\frac{\text{number of cases with changes}}{\text{total number of cases}}
\]
EFFICIENCY OF THE EHEALTH PLATFORM

✓ Critical PAR – 0,99
✓ Non-critical PAR – 0,8
✓ SA- teleradiology – 0,9
✓ Diagnosis changing/correcting - 6,3
Reality was changed!
Recognising

Good Practice Telemedicine Model for MDR-Tuberculosis Care

Download (pdf)  Good_Practice_Model_Telemedicine_for_MDR_tuberculosis.pdf (51.132kb)

A telemedicine network for managing multidrug-resistant tuberculosis

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Accepted: 8 November 2013

Introduction

Multidrug-resistant tuberculosis (MDR-TB) is a serious and dangerous disease. It threatens to become the dominant form of tuberculosis in many parts of the world because of decades of inappropriate treatment on a global scale. The accepted system of MDR-TB care is based on strict clinical protocols and special management measures. In most countries, decisions are made by a special medical commission (SMC); a primary diagnosis of MDR-TB has to be confirmed by the commission and only after that can a patient receive medications (sometimes this process takes a few weeks). During the subsequent two years of treatment, reviews have to be carried out every two months and any side-effects or complications have to be examined. This approach allows control with attending doctors and even patients, and epidemiological monitoring. The closed high-speed network (100 Mbit/s) was constructed especially for the purpose of anti-tuberculosis telemedical work. Desktop videoconferencing is used, and the software provides support for DICOM images (http://www.a-works.com). The web portal of the network (http://www.itih.dn.ua) allows access to the videoconferences. An electronic health records (EHR) system was specially created for the network, which is available via a separate link.

Process comparison

A typical non-telemedicine meeting of the SMC consists of the following stages:
Thank you very much!

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