מכון ויצמן למדע
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Oximet Covid-19 Monitoring and Early Detection Project

Background

A central lesson learned based on the accumulation of experience in treating Covid-19 patients is that early treatment is key to avoid life-endangering deterioration. Since most patients have only mild symptoms that do not require medical treatment and are kept at home, the identification of "alarm signs" for deterioration are cardinal.

In Israel, all sick persons who are not hospitalized are monitored daily by phone-calls from professionals who check for signs of early deterioration. The monitoring is performed by the four major *health services* (HMOs). In particular, each home patient is provided with a pulse oximeter that allows accurate oxygen level measurements allowing Hypoxemia to be detected early. The nation-wide monitoring is likely a major factor in keeping the mortality down. Indeed, despite the resurgence in the number of covid-19 cases across the country due to the fast reopening and relaxation of social distancing directives, Israel has a very low mortality rate compared to other advanced countries.

The objective of the Oximet project is to provide information about this life saving monitoring activity to countries and communities outside of Israel to help reduce mortality rates resulting from the covid-19 and improve efficient hospitalization policy. We stress that the Oximet project relates to the monitoring of confirmed covid-19 home patients and does not deal with measures to stop the spread such as testing nor with the medical treatments that are given to people to avoid or treat deterioration.

The Oximet task force team includes scientists, medical doctors, senior management in the *Jewish Agency for Israel*, business men, communications professional, the *Clalit Health Services* covid-19 control center manager and other professionals and is in direct contact with the professional management of *Clalit Health Services*, the largest HMO in Israel (4.5 million members), and the Israeli ministry of health.

Community Based Monitoring

Community organizations such as religious communities and other social groups oriented towards the welfare of their members have some characteristics similar to the HMOs in Israel in their ability to disseminate information among members, collect information, maintain

contact with members, recruit volunteers (both professional and laymen) and provide a variety of resources to members on an individual, per-need basis. We believe that the community organizations size, structure and functioning could play a crucial role in saving the lives of their sick members by sharing crucial, timely information with community members and providing individual help when needed.

Procedures which communities could perform in monitoring home patients:

1. Identify the sick that are at home within your community:
   Form a hot-line number and use contact resources like the community newsletter and database.
2. Find unused pulse oximeters within the community or purchase them (through epidemiological data we estimate that a community of a thousand people will need around ten oximeters simultaneously).
3. Assemble a volunteer/paid professional medical team (1 M.D. +1 Nurse per thousand people), which will provide the oximeters to the patients (with proper precautions) and will monitor them daily by phone or through house visits.
4. Coordinate with the local health system and make sure urgent care is given to patients with early sign of clinical and respiratory deterioration.

***How does it work*?**

1. A potential or confirmed covid-19 patient contacts the hotline and is referred to the M.D..
2. The M.D. decides whether the patient needs community monitoring.
3. If yes, the M.D. or nurse has an oximeter delivered to the patient with instructions and checks on him/her daily by phone or house visit.
4. If the M.D. decides there are signs for clinical and respiratory deterioration, the patient is rushed to the local hospital.

The Ministry of Health issued a guideline for the responsibilities and procedures of the *HMOs* and other relevant bodies dealing with covid-19 patients and for the coordination between the different bodies – last update published 6 July 2020 "*Hospitalization / Treatment in the Community of confirmed COVID-19 Patients – update 5*", which is provided in full in Hebrew as a separate document (57 pages). Appendixes A – C are free-translations of the relevant sections of the guideline. The management of covid-19 patients is divided into three areas: home patients, covid-19 recovery hotels and hospitals. The *HMOs* are responsible for the monitoring of patients' health at home and in the hotels. Each *HMO* and their various regional offices implement the guidelines according to their local conditions and resources.

Appendix A: Procedure for the treatment of 19-COVID patients with mild conditions at home (section III, item 1., pg. 9, in the original document)

1. The HMOs are responsible for monitoring and treating their member patients that are at home (according to the procedures described in the full document, see Appendix B here for central points)
2. Monitoring and treatment of patients at home who are not members of an HMO will be carried out under the responsibility of the health bureaus with the assistance of service providers ("Visiting Doctor" and "Before" companies).
3. It is preferable that monitoring and treatment of patients with mild symptoms is preformed remotely and when required through the arrival of a protected medical staff at the patient's home.
4. Dedicated general practitioner (GP) medical care will be given to suspected persons who are isolated and to identified sick (separately to each of these groups) to avoid the exposure of healthy persons to the disease in GP Clinique's. When monitoring the patient, the one must assess the degree of isolation conditions in his home.

Appendix B: Monitoring and treatment by the HMOs of patients in their home (section III, item 3., pg. 9, in the original document)

1. Medical response to patients will be available 24/7 through a remote medical center.
2. Purpose of medical surveillance:
a. Identify as early as possible a deterioration in the patients' condition and refer them to the hospital;
b. Preventing aggravation in existing medical conditions by maintaining a therapeutic sequence;
third.
c. Preventing a condition in which the patient leaves his or her home for medical assistance in situations that do not require it.
3. The first medical meeting will be conducted by a medical doctor who will assess the patient's condition and the need to refer him to a hospital or a dedicated covid-19 hotel.
4. Guidance should be given to the patient on the following topics: Isolation guidelines, symptoms and signs that require the patient to seek medical assistance.

5. Proactive continuous contact will be maintained with the patient as described in the rest of the full document (in particular see next item). Digital devices may be used to ease the reporting and documentation.
6. The required follow-up is detailed in Appendix B, including the need to monitor vital parameters: pulse rate, temperature, oxygen saturation as well and documentation in the patient's medical file.
7. There will be a remote medical appointment with a medical doctor (M.D.) from the HMO, in a situation where there is a suspicion of aggravation of the medical condition of the patient. The M.D. will decide whether the patient's condition allows for continued treatment in the community or require hospitalization (Coordination with MDA* Hospital is required).

8. In any case of significant worsening of the patient's condition, he will be instructed to contact the 101 hotline immediately.
9. Examination or treatment in the physical presence of a medical team will be carried out if the medical appointment cannot be postponed to the end of the isolation period. In such a case, a team of protected caregivers will be sent to the patient's home.
10. Delivery of medicines to patients will be made by delivery to their home and in accordance with the usual procedures at the *HMO* (except in exceptional cases).
11. If it is not possible to have the medical appointment at the patient's home and in cases where the examination / treatment cannot be postponed, a medical appointment, preferably in an outbreak clinic (if operated) will be coordinated.
12. The patient will be guided to the outbreak clinic using a mouth mask though. Patients should not leave the isolation or return from isolation through public transportation.
13. As a general rule, it preferable that patients will be monitored by their HMO personal physician as part of medical services from afar (by telephone).
14. Having a medical appointment (using remote medicine) with a new patient in his home as close as possible to the initial diagnosis or after being discharged from the hospital (in cases where a patient in mild condition was released from hospitalization to his home and not to a recovery hotel) for the purpose of assessing their medical condition and to instruct how to use the monitoring equipment, which they received.

* MDA – Magen David Adom. The equivalent to a Red Cross emergency and ambulance service.

15. Providing a monitoring kit that includes a thermometer, oxygen saturation meter and surgical masks for patients, it is recommended that the monitoring equipment will be distributed to all patients. In the event of a shortage of such equipment, priority will be given to the patient populations mentioned in the section IV in the full document.
16. Discharge of a patient from isolation will be only after they are defined as recovering according to the updated criteria.
17. A covid-19 test from a caregiver will be coordinated by the HMO and is the HMO responsibility to provide it including the delivery to the test labs.
18. Persons living with sick patients are required to be in quarantine for a period of 14 days since the last contact with the patient.
19. The updated policy of taking tests to decided when a patient has recovered is attached as an appendix in the full document.

Appendix C: Daily Monitoring of Adult Patient at Home / Recovery Hotel (Appendix ג' in the full document, pg. 20)

1. Questions for tracking adult patient at home / hotel:

- Has your condition worsened during the last few hours (since the previous reporting)?
- Do you have difficulty breathing? : Yes / No
- Is it difficult for you to finish a sentence when you speak? : Yes / No
- Do you manage to eat? : Yes / No
- Do manage to drink?: Yes / A little / No
- Did you vomit 3 times or more during the last 24 hours? Yes / No
- Have you had diarrhea 4 times or more during the last 24 hours? : Yes / No
- Have you given urine in the last +6 hours? Yes / No

What is the patient's pulse rate? (A medical appointment should be held if the value is over 110)

- What is the patient's oxygen saturation level? (A medical appointment should be held if the value is below 93 or a 2% decrease compared to the previous value).
- What is the patient's temperature? (A medical appointment should be held if the value is above 39 degrees centigrade after an attempt to reduce temperature or below 36 degrees).
- Are you concerned or feeling mentally distressed by your condition? Yes / No

2. Given an answer that is not "no" in one of the questions or the presence of abnormal signs, a telephone medical meeting will be held with the patient.

3. The monitoring calls will be conducted at least once a day and will be documented in the medical files.

4. Less calls per week can be considered once there is improvement in the patient's condition: the fever is over and there are no breathing problems.

5. Monitoring of asymptomatic patients can be done twice per week.

6. A decision to monitor the patient less frequently than once per day will be made based on medical considerations that take into account the parameters of the patient (previous conditions, how well does he collaborate with the medical staff etc.)

If a patient's condition worsens significantly, he will be instructed to contact the HMO and the hotel's emergency department. If no contact is made on the patient's initiative, the HMO must establish the contact and hold the medical meeting on its own initiative.