

# A Self-Monitoring Based Telenursing System for Home Oxygen Therapy (HOT) Patients Yielded Prevention of Hospital Readmission

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## Introduction

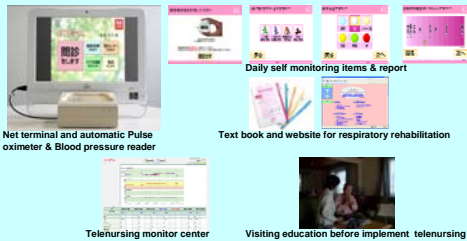
The number of chronic respiratory failure patient with Home Oxygen Therapy (HOT) in Japan is approximately 130 thousand and the patient is increasing since health insurance covered for HOT in 1985. Moreover the patient's HOT period becoming more longer and recent their mean age becoming more higher in Japan.

It is important for HOT patients to prevent acute respiratory exacerbations and provide preventive nursing care as maintain and keep patients' quality of life (QOL). However their self monitoring for keep physical and mental conditions sometimes belated and passed the early signs of respiratory exacerbations.

Self monitoring- based life management telenursing system for HOT patients (LMS-HOT) was developed to provide a directive care for HOT patients from long distance telenursing center, and the system consists of four component systems administered by the nursing monitoring center in our college.

LMS-HOT consists;

- (1) internet terminals in the patient's home
- (2) telemonitoring with literature and symptom-based algorithm that trigger individualized response data
- (3) the data server supporting the interactions and telementoring system
- (4) educational systems to guide patient compliance.



## Purpose

This research showed the triage and effectiveness of LMS-HOT in preventing hospital readmissions caused by acute exacerbations of respiratory failure.

## Methods

### Subjects

Convenience sample of twelve HOT patients from eleven hospitals participated to this study. Nine males and three females with mean age 73.2 (SD 9.2) employed LMS-HOT and mean HOT period was 20.4 (SD 11.9) month.

### Methods

Each subject employed LMS-HOT between 4 days to 499 days. Subjects submitted daily health and mental status reports to the monitor center via an internet in the morning. Telenurse triggered the patients immediately and provide telementoring according to individual nursing protocol.

### Data collection

HOT patients submitted to the daily data to the monitored center and the data was stored to the data server. A total of 1,273 days of the 22 item self- monitoring daily data was stored.

When HOT patients finished the participation to this research, patient responses to the Health-Related QOL (SF-36™ in Japanese), and interviewed patients' statements about using LMS-HOT, and whether to admit to the hospital provided the data for analyses.

### Ethical considerations

Patients were given oral and written explanations of the purpose and methods of the research. All were assured that they could choose to continue participation or withdraw at any time without disadvantage and that we would protect their privacy. This research was approved by the Ethics Committee of St Luke's College of Nursing, and complied with the Declaration of Helsinki.

## Results

### Characteristics of the patients

Diagnosis	Pulmonary emphysema 9 Others (Asthma, Sarcoidosis ) 3
Sex	9 Male and 3 Female
Age	Mean 73.2 (range -55-86) y.o
HOT period	Mean 20.3 (range 14-119) month
Telenursing period	Mean 310.8 (range 4-499) days
Received data <sup>a</sup>	Mean 290.6 (range 4-464) times
Triggered data <sup>b</sup>	Mean 214.7 (range 0-424) times
Triggered ratio <sup>c</sup>	66.3%
Triggered point	Sputum vol. up, Bloody sputum, Lower peak flow, Cough, Body pain, Leg edema, Palpitation, Fatigue

### Report and triage

Total 1,279 telenursing day, of the 1,174 reports submitted, the telemonitoring protocol indicated: no-trigger for 223 reports (19.0%), trigger for 165 reports (14.1%), and urgent-trigger for 786 reports (67.0 %).

### Triaged parameter

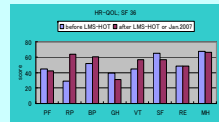
On the day of triggering, parameters were significantly lower for SpO<sub>2</sub>, peak flow, Borg scale 10 of perceived dyspnea score and daily total points.

### Hospital readmissions

Eleven patients did not occurred hospital readmission. One of the patient (75yo, Male, Pulmonary Emphysema, Stage IV) readmitted to the hospital on the 11<sup>th</sup> day of the LMS-HOT implementation. In this case, firstly decreasing peak flow and after few days, dyspnea, cough, appetite loss and sputum volume appeared increasingly. Physician diagnosed early stage of COPD exacerbation and decided to admit to the hospital, because report of daily triggered point from monitor center got worse every day. Physician was able to begin treatment at early stage and treated for 24 days and the patient discharged to his home.

### Health related QOL(SF36™)

5 patients finished the participation of the research and compared SF36™ before and after employing LMS-HOT. There was no significant difference.



### Patient's response for telenursing

The patients reported that LMS-HOT alleviated anxieties in daily life, resolved problems at early stage, improved self-care awareness and provided a connected sense of security.

### Physicians' comment for telenursing

This system could understand patient's conditions similar to real time. It is effective for prospective and early treatment at the early stage of the exacerbations.

## Discussions

As for the using this telenursing system, patient understand the psychical and mental conditions by themselves and had a confidence to pulmonary rehabilitation. For the case of implement for more than six months, they never readmitted to the hospital. It was thought that the sense of security was able to be brought to the patients, to prevent the re-hospitalization, and to expect the improvement of QOL related to health of long-term practice.

### Strength and limitations

It will be necessary to have a intervention for much cases continuously and innovate telenursing system in the future.

## Conclusion

These results suggested that exacerbation episodes identified when one or more parameters triggered the emergency alarm yielded an over-all incidence rate of 81.0% (951/1174). However, there were no occurrences of patients' hospital readmissions during the LMS-HOT period except one case and it alleviated anxieties in daily life and resolved problems at an early stage.

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