How can Watch-PAT adopt the “WIN” strategy

Ka Chun YIU
BN (Hons) CUHK, MNurs UB
APN (NSD)
United Christian Hospital

Yiu KC¹, So WY², Ha SCN², Lee DLY², Abdullah VJ²,³, Van Hasselt CA³
¹Nursing Services Division, United Christian Hospital
²Department of Ear, Nose & Throat, Head & Neck Surgery, United Christian Hospital
³Department of Otorhinolaryngology, Head and Neck Surgery, The Chinese University of Hong Kong
Obstructive Sleep Apnea (OSA) is a common sleep disorder affecting:
- 2% of middle-aged women
- 4% of middle-aged men in Hong Kong.

Overnight Polysomnography (PSG) is the gold standard for the identification and assessment of severity of OSA, nonetheless, it is:

- Labor intensive
- Resource demanding
- OSA patients are usually put on long waiting list
Introduction

To overcome the problem, a variety of screening tools are designed in order to substitute PSG. An ideal screening tool should be:

- High accuracy,
- Cost effective,
- Conveniently accessible,
- Easy to use, and
- With no risks

Watch-PAT

one of the screening tools to design for identifying OSA patients
Study Objective

To explore the effectiveness of Watch-PAT prior to the preliminary impact on the services after implementation of Watch-PAT Loan Scheme at ENT Department.
Obstructive Sleep Apnea

- Sleep apnea is a serious, potentially life-threatening sleep-related breathing disorder that is often linked with heavy snorers.

- Commonly, OSA may be triggered by an obstruction in the upper airway

- It results in decreasing the amount of inhaled air and disrupting sleep quality.
What is Obstructive Sleep Apnea
Watch-PAT is designed to be worn on the wrist like wearing a watch. As a portable and simple wrist-worn machine, Watch-PAT has easy-to-use characteristics.
What is Watch-PAT

- Watch-PAT measures 6 channels:
What is Watch-PAT

- The machine can generate the sleep report automatically by using Itamar Limited proprietary software. The sleep report shows the following data:

- Total Sleep Time
- Apnea-Hypopnea Index (AHI)
- Pulse Rate Statistics
- Snore Level (dB)
- Respiratory Disturbance Index (RDI)
- Oxygen Saturation Statistics
- Body Position
- Sleep Stages
What is Polysomnography (PSG)

- Overnight polysomnography (PSG) is the **gold standard** for the identification and assessment of severity of OSA.
What is Polysomnography (PSG)

• Full PSG machine has a main device for the storage of all signals:

- EEG;
- EOG;
- ECG;
- Leg and chin EMG;
- Nasal/oral airflow by thermistor and nasal cannula;
- Oxygen saturation;
- Body position;
- Thoracic and abdominal movements;
- Snoring; and
- Synchronized video recording
What is Polysomnography (PSG)

- The sleep report can be generated automatically. At Ward 13B (ENT/UCH), manual scoring will be conducted for all sleep study cases by nurses.
Methodology

Phase ONE:
➢ Investigating the accuracy of Watch-PAT data acquisition alongside a full PSG for OSA patients

Phase TWO:
➢ Exploring the impact of Watch-PAT Loan Scheme at ENT Department

✓ The project was contemplated by the “WIN” strategy, THREE elements are:
   ➢ Watch-PAT
   ➢ Inpatient
   ➢ Nurse
Investigating the accuracy of Watch-PAT data acquisition alongside a full PSG for OSA patients

- Selection Criteria: Patients with snoring and daytime sleepiness;
- Sampling: 48 patients (38 male vs. 10 female with a mean age of 41.85 and mean BMI of 24.69);
- Method: All of them had a full PSG (Somno-medic) and Watch-PAT (Itamar Watch-Pat 200) on the same night.
• **Analyzing:** Technologists extracted the results from Watch-PAT (n=48), and scored the PSG study according to the American Academy of Sleep Medicine (AASM) Manual for Scoring 2007.
Methodology

• **Measuring**: Mild, moderate and severe OSA were defined by using *Respiratory Disturbance Index (RDI)* with cut-off value at 5, 20 and 40 respectively;

• **Comparison**: Categorized the results of Watch-PAT according to the severity; and then compared the results with PSG

*The RDI is the index represents the respiratory events which is recommended measurement for the severity of OSA, by the American Academy of Sleep Medicine (ASSM).
1) Effectiveness of **Watch-PAT**

- 48 patients (n=48) with daytime sleepiness and snoring were recruited from 2010 to 2012. Both Watch-PAT and full PSG have been undergone on the same night at ward.

**Result:**

- Average RDIs were **23.11 (PSG)** and **27.36 (Watch-PAT)** respectively.
- Watch-PAT only slightly overestimates RDI (reflect the severity of OSA) of **4.25** on average (p<0.01).
Watch-PAT demonstrates good reliability as a screening tool for patients with suspected OSA. **100% in sensitivity** indicated all patients with OSA can be recognized.

The **specificity=9.09%** was the result found in the category of RDI =5 (cases with mild OSA) when comparing with PSG.

However, the **specificity reached around 90%** when RDI=20 (cases with moderate OSA) and 40 (cases with severe OSA) respectively.

Table 1: Sensitivity and specificity of Watch-PAT comparing with gold standard PSG

<table>
<thead>
<tr>
<th>Cut-offs</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDI=5</td>
<td>100%</td>
<td>9.09%</td>
</tr>
<tr>
<td>RDI=20</td>
<td>100%</td>
<td>91.67%</td>
</tr>
<tr>
<td>RDI=40</td>
<td>87.5%</td>
<td>87.5%</td>
</tr>
</tbody>
</table>
There was only 1 case in which Watch-PAT underestimated the severity of OSA when comparing with PSG.

Other 31 cases (by Watch-PAT) had the same severity comparing with PSG.
Findings & Outcomes – Data Analysis

- In general, it slightly overestimates the severity of OSA in comparison with the gold standard PSG.

- Watch-PAT is an effective screening tool especially in detecting moderate to severe OSA patients.

- The accuracy of estimating the severity of OSA by Watch-PAT was 64.58%.

- Statistically, it demonstrates good reliability as a screening tool for patients with suspected OSA.

- It can effectively refer actual OSA patients to admit for PSG whenever necessary.
2) **Not Restricted to Inpatient only**

**Traditional Sleep Study**
- Hospitalization
- Inpatient service
- Launched and monitored by nurse

**Watch-PAT**
- Home
- Self help
- Manipulated by patient
- **Education by nurse**

>>> THE Watch-PAT Loan Scheme is launching at ENT Department
基督教聯合醫院

13B 耳鼻喉科病房

睡眠測試(外借 Watch-PAT)病人須知

借取事項
1. 請攜帶通知書，到本院 S 座 13B 病房辦理有關借取 Watch-PAT 手續。
2. 病人須攜帶身份證親身到取。(18 歲以下人仕，需有成年人陪伴)
3. 由於 Watch-PAT 充電需時，病人到達病房登記後，需等待約兩小時。如病人有急事需離開，請留下聯絡電話號碼，以便病房職員與病人預約日期到取 Watch-PAT。
4. 病人須於借取當晚使用 Watch-PAT，所以 Watch-PAT 不可提早外借。
5. 病人須翌日十二時前交還 Watch-PAT 予病房，如病人沒空可找他人代還。
6. 如 Watch-PAT 借取或交回當日，天文台發出黑色暴雨警告，或懸掛八號或以上的颱風訊號，此項安排會於取消。請於稍後時間致電病房(電話：3513 4480)查詢之後的安排。

使用 Watch-PAT 需知

為確保 Watch-PAT 正常運作及避免損壞，請病人留意以下事項：
1. 請依照病房職員指示操作 Watch-PAT，亦可參閱隨儀器附上的指引。
2. 切勿拆掉及按住非指示操作 Watch-PAT 之按鈕或電線。
3. 切勿弄濕 Watch-PAT。
4. 請儘量避免 Watch-PAT 受到碰撞、跌破及受壓。
5. 在睡前才可戴上 Watch-PAT 及啟動儀器。
6. 請確保使用 Watch-PAT 前把手指甲剪短及脫去手上飾物。
7. 請在使用 Watch-PAT 前，確保沒有使用指甲油及潤手霜等。
8. 如有任何問題，請致電病房(電話：3513 4480)查詢。
Education by Nurse

Watch-PAT 200 使用說明 User Guide

(1) 連接睡眠測試儀之前 Before Putting on the Device
a. 按上睡衣 Dress on your pyjamas
b. 打開 Watch-PAT 存放盒，取出使用說明 Open the Watch-PAT carrying case, take out the user guide
c. 把 Watch-PAT 放在不慣常使用的那隻手背上 Put the Watch-PAT on your non-dominant hand
   * * * 用左手手指甲切去右手上指甲，並請把長指甲及指甲油不用使用護手霜 Make sure that the fingernails of the hand is trimmed and without polish, remove all jewelry and avoid using hand cream

(2) 安裝紅外線體位感應器 Placement of the Snore and Body Position Sensor
a. 把紅外線體位感應器從睡衣下穿過 Thread the Snore and Body Position Sensor through the sleeve of your pyjamas up to the neck opening
b. 擺開紅外線感應器尾部的膠紙，把感應器貼在頭後下方 Peel off the paper of the Snore Sensor, attach it to the base of the neck and secure it in place with medical tape
c. 擺開紅外線體位感應器尾部的膠紙，把感應器貼在頭後下方 Peel off the paper of the Body Position Sensor and pull them off the sensor while placing it on the chest bone
d. 連接紅外線體位感應器及 Watch-PAT Connect the Body Position Sensor with Watch-PAT

(3) 安裝血氧感應器 Attach the Oximetry Sensor
a. 把 Watch-PAT 放在手腕上，佩戴上並貼好手帶，確保手帶伸直，但不要太緊 Place the Watch-PAT on a flat surface, insert your hand and close the velcro strap, make sure it is locked, but not too tight
b. 把血氧感應器放在手腕上，如外皮的一面朝下，然後用膠帶始保護貼 Place the Oximetry Sensor on a flat surface with the side with writing facing down, then peel off the protective backing
c. 擺無名指的指指尖放在血氧感應器的指嵴上 Place the tip of your ring finger just before the mid-line of the Oximetry Sensor
d. 擺無名指的指指尖放在血氧感應器的指嵴上 Place the tip of your ring finger just before the mid-line of the Oximetry Sensor

(4) 戴上 PAT Probe 感應器 Place the PAT Probe on your index finger
   a. 把 PAT Probe 感應器戴入食指 Place the PAT Probe on your index finger
   b. 把手指指端選擇器的指端面，與 TOP 頂端的一側對齊著 Push the finger tip selector to the top end of the finger, and the tab labeled TOP should be at the top side of the finger, and the tab labeled BOTTOM should be on the underside
   * 如食指頂部尚並未戴入感應器，可選用其他手指代替，例如尾指 If your index finger is too thick for the PAT Probe, you can choose another finger that fits better, such as your small finger

(5) 啟動 Watch-PAT Turn on the Watch-PAT
a. 睡在床上，用力按着 Watch-PAT 上的圆形開關按鈕數秒，直至聽到 開關出言 "I am ready" 又字 Get into bed, and press firmly on the round ON button for a few seconds until you hear "I am ready" on the LCD screen
b. 30 秒後，屏幕中央會出現 "Good Night" 字樣，表示開始睡眠測試 After 30 seconds, a "Good Night" in the middle of the screen indicates the study has started

(6) 睡眠測試翌日 The Day After Sleep Test
a. 除去 PAT Probe 感應器及顯示器 Remove the PAT Probe, Oximetry Sensor and the device
b. 把所有手環、感應器及說明書收回 Place the device along with the PAT Probe, Oximetry Sensor and the user guide back to the Watch-PAT carrying case
   * 此圖測試儀處於無電開電源，紅色顯示燈會一直亮着，這是正常的 Watch-PAT cannot be turned off, a red light will glow from the Oximetry Sensor. This is normal.

如你依照以上的步驟，就可以成功使用 Watch-PAT 進行睡眠測試。 If you follow the steps presented here carefully, you should have a successful Watch-PAT sleep diagnostic test.
Findings & Outcomes:

- 30 cases (in 5-month) were participated in the Watch-PAT Loan Scheme.

- It significantly shortened the patient waiting list for sleep study from **6-12 months (PSG)** to **within 1 month (Watch-PAT)**.

- On the other hand, more beds can be relieved to accommodate for the huge demand, i.e. Emergency or Post-operative cases resulting in better resources allocation.
3) Relieve workload of frontline Nurse

- Using of PSG
  - 30 mins of hook-up
  - 15 mins of system set-up
  - 480 mins (8hrs) of overnight monitoring
  - 150 mins of manual scoring

- Using of Watch-PAT
  - 5 mins of orientation on loan scheme
  - 20 mins of education on device usage
  - 5 mins of data generation from device
Findings & Outcomes

Resources saved from One patient

= 645 mins of nursing manpower
+ 1 overnight bed

>>Nurses spend relatively plenty of time on inpatients in order to maximize the quality and safety of services.
Conclusion and Recommendation

• High sensitivity of Watch-PAT indicated patients with OSA can be recognized. Obviously, it is **useful screening tool to detect OSA**.
• Both patients & nurses get benefit from the **Watch-PAT Loan Scheme**.
• **Win-win situation** is accomplished by the project.
• Findings drop hints for better resources allocation:

- Enhancing the **Watch-PAT** Loan Scheme
- Not restrict to **In-patient only**
- Minimizing the workload of **Nurses**
- "**WIN**" situation is accomplished


Dr. Victor Abdullah, CCOS ENT/KEC
Mr. Joseph Ka Kin NG, CDOM ENT/KEC
Thank You