

Supplementary file

Supplementary Figure 1. The score of E-NEWS could be drilled down to view the original data, including respiratory rate, consciousness, systolic blood pressure, O2 therapy, pulse rate, and sPO2. The trend of each item can be traced from the time that a patient is admitted.



Supplementary Figure 2. The E-NEWS Dashboard was designed for each ward. The scores are shown in green (0~3), yellow (4~6) and red (≥ 7). We can trace the trend of the scores from the time the patient is admitted. The trend within the last 48 hours is set as the default. The E-NEWS dashboard for the division is the same as for the ward, except the list of divisions.



Supplementary Figure 3. If the E-NEWS meets the criteria, i.e., the E-NEWS increased to more than 4 in the last 12 hours and the last E-NEWS was ≥ 7 , we sent a message to the care team (left) and to the in charge attending physician. (right).

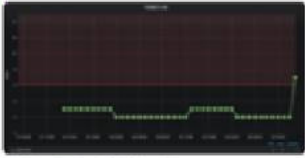
Send the risk message to the care team by Line

LINE Notify

【早期警示系統通知】(護理(24小時)≥7分, 差分≥4) 床號 W55-011
姓名: 陳○銘
於2019-04-03 07:00:00
警示分數已達臨界值, 請查看病人狀況

上午 11:02

LINE Notify



上午 11:03


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LINE Notify

【早期警示系統通知】(護理(24小時)≥7分, 差分≥4) 床號 W6-123
姓名: 陳○國
於2019-04-03 09:00:00
警示分數已達臨界值, 請查看病人狀況

上午 11:03

LINE Notify



Send the risk message to in-charge physicians

14:57

中榮簡訊

語音 FaceTime 資訊

EWS簡訊測試，台中榮總關心您!!

蔡○瑾 醫師，你的病人 W66-122(陳○銘)，目前最近一次的早期警示分數 ≥ 7 分，請你查看病人狀況，台中榮總關心您!!

今天 14:55

劉○沅 醫師，你的病人 W52-313(劉○毓)，目前最近一次的早期警示分數 ≥ 7 分，請你查看病人狀況，台中榮總關心您!!

Supplementary Figure 4. This is the interface of the Nurse Information System (NIS) for the nurse shift. The score is transferred to the sheet of the shift automatically. Therefore, the score of each patient is checked every 8 hours.

The screenshot displays the 'Nursing System' interface. At the top, there's a navigation bar with various menu items like '報告查詢', '進入住院', '進入急診', '檢查報告', '故障排除指南', '疫情通報', '個人訊息', and '資訊室'. Below this is a patient information section for 'W106 - 111', identifying the patient as '鄭 (女) (A+型) (健康普)' with a diagnosis of 'Primary malignant neoplasm of bronchus of left upper lobe'. The system also shows the attending physician '0900J 張 (呼吸)' and the ward '胸內科 (CM)'. A central table lists '護理文班內容' (Nursing Class Content) with columns for '日期' (Date), '事項' (Item), and '修改' (Modify). Two rows are highlighted with red boxes, showing E-NEWS scores: '2020/04/11 2300 早期警分數: 8分' and '2020/04/12 2300 早期警分數: 7分'. A third row shows '2020/04/13 0700 早期警分數: 7分'. A callout bubble points to these rows, stating 'The score of E-NEWS is transferred to the nurse shift automatically.' Another callout bubble points to the patient information section, stating 'Nurse records marked with shadow because of privacy'. A third callout bubble points to the '護理文班內容' table, stating 'The contents for nurse shift'. At the bottom, there are checkboxes for '不需協助', '護理死亡退家', '車程時間', and 'DNR'.

日期	事項	修改
2020/04/06	...	修改
2020/04/07	...	修改
2020/04/10	...	修改
2020/04/11	2020/04/11 2300 早期警分數: 8分	修改
2020/04/12	2020/04/12 2300 早期警分數: 7分	修改
2020/04/13	2020/04/13 0700 早期警分數: 7分	修改
2020/04/13	會安寧緩和(待)	修改
2020/05/01	...	修改

Supplementary data

We retrospectively reviewed those who fulfilled the criteria of E-NEWS scores increasing to more than 4 in the last 12 hours and the last E-NEWS ≥ 7 (that is, his in charge physician received alarm text message) in September of 2019. There were totally 496 patients impending deterioration. Sixty-seven patients (13.5%) died whereas 34 patients (6.9%) were transferred to intensive units in the following 48 hours. It is higher than that in general hospitalized patients. Abovementioned data justified that we used such criteria for sending alarm text message to in charge physician.

- Condition in the following 48 hours

	Patient No.	%
Stay in ward	395	79.6
Transfer to ICU	34	6.9
Died	67	13.5
Total	496	100.0

Supplementary Table 1. The ICD-9 and ICD-10 codes of co-morbidities

Category	ICD-9	ICD-10
Cancer	140–208	C01–C96, D03
Cardiovascular disorder	393–398, 401–405, 410–417, 420–429, 440–449	I05–I13, I15, I20, I28, I30–I52, I70–I71, I75, I77, I97
Neurological disorder (non-stroke)	320–327, 330–337, 340–359	B45, E08–E13, E75, G00–G13, G20–G26, G30–G32, G35–G37, G40, G43, G44, G47, G50–G65, G70–G73, G80–G83, G90–G99
Neurological disorder (stroke)	430–438	G45, G46, I60–I69
Respiratory disorder	480–487, 490–496, 500–519	A22, A37, A48, B25, B44, J09–J18, J22, J39, J40–J45, J47, J60–J70, J80–J82, J84–J86, J90–J99, R09, R91
Diabetes	250	E08–E11, E13
Gastroenterology	530–537, 540–543, 550–553, 555–558, 560, 562, 564–579	B25, J86, K20–K23, K25–31, K35–K38, K40–K46, K50–K52, K55–K63, K63–K77, K80–K83, K85–K87, K90–K92, K94, R16, R18
Renal disorder	430–404, 582–583, 585–586, 588, V42, V45	I12–I13, N03, N05–N08, N14–N19, Z94, Z99