

台灣新制急診檢傷分類： 觀念與實務

Prof. Wang, Tzong-Luen

MD, PhD, JM, FESC, FACC, FCAPSC
Shin-Kong Wu Ho-Su Memorial Hospital
Medical School, Fu-Jen Catholic University
102.08.07

2013

1

內容

- 檢傷分類之意義、觀念及運用
- 五級檢傷分類之概念
- 台灣新制五級檢傷分類
- 五級檢傷可能衍生之問題與對策

Wang TL. Concept of Triage

2

Triage: Definition

- To elucidate the severity and urgency
- To determine the priority of management

Wang TL. Concept of Triage

3

Triage: Purpose

- To assure the care quality of emergency medicine
- To judge the adequacy of national health insurance policy

Wang TL. Concept of Triage

4

Class I (立即處理) 四級檢傷

- 意識程度下降
- 生命現象：
 - 收縮壓： $<80\text{mmHg}$ 或 $>220\text{mmHg}$
 - 心跳： $>150\text{bpm}$ 或 $<50\text{bpm}$
 - 呼吸： $>30\text{rpm}$ 或 $\leq 8\text{rpm}$
 - 體溫： $\geq 41^\circ\text{C}$ 或 $\leq 32^\circ\text{C}$
- 內科：異物阻塞；已插氣管內管或胸管者；呼吸窘迫；發紺；心因性胸痛；正在抽搐；內出血併生命現象不穩定者
- 外科：外傷出血無法控制者；大於5cm的開放性傷口；疑呼吸道(顏面)灼傷；電灼傷；化學性灼傷；三度TBSA $>10\%$ ；二度TBSA $>15\%$ ；骨盆或股骨骨折；開放性骨折；疑頸椎骨折；頭部嚴重畸形；腦組織外露；內臟外露；皮下氣腫；胸腹開放性傷口；毒蛇、虎頭蜂咬傷；槍傷或穿刺傷；**家暴；兒虐**
- 婦產科：急產；性侵害
- 精神科：攻擊性行為

Wang TL. Concept of Triage

5

Class II (十分鐘內處理) 四級檢傷

- 生命現象：
 - 收縮壓： $180-220\text{mmHg}$
 - 呼吸： $20-30\text{rpm}$
 - 體溫： $39-41^\circ\text{C}$ 或 $32-35^\circ\text{C}$
- 內科：呼吸喘；呼吸困難；胸痛原因不明者；疼痛併嚴重症狀者(劇痛、臉色蒼白)；暈眩(Vertigo)；突發性神經症狀；內出血併HR $>100\text{bpm}$ ；吐血；嘔吐、腹瀉、脫水致HR $>100\text{bpm}$
- 外科：小於5cm的開放性傷口；疑有骨折；關節腫脹；疑頭骨骨折；其他昆蟲、動物咬傷；急性尿滯留(≥ 6 小時)
- 精神科：自殺行為或傾向
- 眼科：眼內異物
- 耳鼻喉科：耳鼻咽喉道內異物

Wang TL. Concept of Triage

6

Class III (三十分鐘內處理)

四級檢傷

- 生命現象：
 - 體溫：38-39°C
- 內科：抽搐已停止者；疼痛但無嚴重症狀者；頭暈(dizziness)；血便、黑便、咳血但生命徵象穩定者；嘔吐、腹瀉但生命徵象穩定者；疑似或輕微中風
- 外科：無傷口之軟組織傷害；動物抓傷；血尿；尿路結石；解尿困難
- 精神科：失眠

Class IV (可延後處理) 四級檢傷

- 不符合急診以上條例，如：
 - 頭痛、喉痛、咳嗽、流鼻水等感冒症狀。
 - 中風後遺症。
 - 中風已數日，在別處已處理過，來本院等住院者。
 - 已知癌症的病患，其主訴顯然與癌症有關者，且生命徵象正常。
 - 自門診轉來做常規檢查的治療者。
 - 自門診轉來等住院者，但生命徵象正常者。
 - 主訴某種症狀已有相當時日，但生命徵象正常者。

Significance of Triage

- Is triage just once for each ER patient?
- Does the triage provide only the benefit of maximally 30 min difference in priority of management at the initial stage?

Repeated and Dynamic (READ) Triage

Thinking

- Is Traditional Triage Useful for Most Case Scenarios?
 - Not Definitely
 - Not work for Pediatric Patients
 - Not work for Trauma Patients
 - Individualization is necessary!!

大量傷患分類 (Mass Casualties)

極危險、第一優先(紅色)

1. 呼吸停止或呼吸道阻塞。
2. 被目擊的心臟停止。
3. 動脈斷掉或無法控制之出血。
4. 穩定性的頭部受傷。
5. 嚴重的頭部受傷且意識昏迷。
6. 開放性胸部或腹部傷害。
7. 大型或併發性燙傷。
8. 嚴重休克。
9. 呼吸道燙傷或灼傷。
10. 壓力性氣胸。
11. 內科醫療疾病的併發症。
12. 關節骨折且遠端無脈搏。
13. 股骨骨折。

危險、第二優先(黃色)

1. 背部受傷(不論是否有脊椎受傷)。
2. 中度的流血(少於二處)。
3. 嚴重燙傷。
4. 開放性或多處骨折。
5. 穩定的腹部傷害。
6. 眼部傷害。
7. 穩定性的藥物中毒。

輕傷、最低優先、延後處理(綠色)

1. 小型的挫傷或軟組織傷害。
2. 小型或簡單型骨折。
3. 肌肉扭傷。
4. 凡是由於受傷過於嚴重(如：頭部外傷且腦組織外露，三級灼傷且超過體表面積百分之四十以上)且存活機會不太大者。

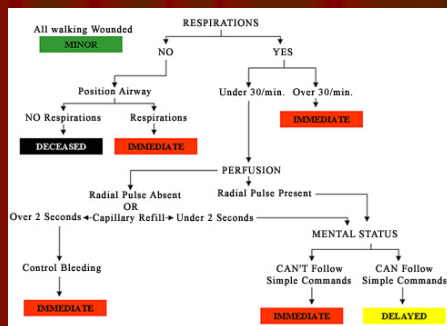
死亡(黑色)

1. 頭部不見。
2. 沒有脈搏超過二十分鐘，除了冷水溺水或極度低體溫者。
3. 軀幹分離。
4. 從高度落下且具有多處的受傷與骨折，沒有呼吸者。
5. 肉臟外脫。

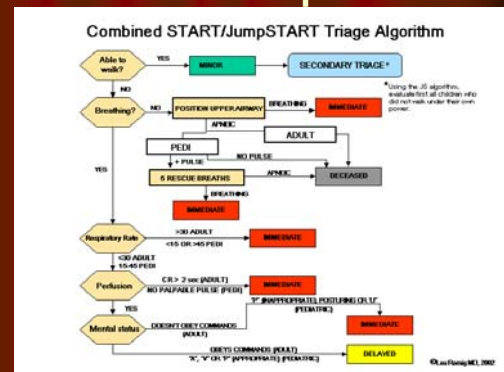
Rationale for Mass Casualty Triage

- Reverse Triage
- START
- Rationale:
 - Effective Use of Limited Resources
 - Grave Outcome of Traumatic Cardiac Arrest
- Exceptions:
 - Reverse Reverse Triage
 - Lightening

START



START / JumpSTART



Triage Decision Scheme (Trauma)

- **STEP 1: Measure Vital Signs and Level of Consciousness**
 - GCS<14
 - RR<10 or >29
 - SBP<90
 - RTS<11
 - PTS<9

Wang TL. Concept of Triage

19

Triage Decision Scheme

- **STEP 2: Anatomic and Physiologic Approach**
 - Flail chest
 - Two or more proximal long-bone fractures
 - Amputation proximal wrist/ankle
 - All penetrating trauma to head, neck, torso, and extremities proximal to elbow and knee
 - Limb paralysis
 - Pelvic fractures
 - Combination trauma with burns

Wang TL. Concept of Triage

20

Triage Decision Scheme

- **STEP 3: Trauma Mechanisms**
 - Ejection from auto
 - Death in same passenger compartment
 - Pedestrian thrown or run over
 - High-speed auto crash
 - Initial speed >40mph (64 kph)
 - Major auto deformity >20 inches (50cm)
 - Intrusion into passenger compartment >12 inches (30cm)
 - Extrication time > 20 minutes
 - Falls > 20 ft
 - Roll over
 - Auto-pedestrian injury with > 5mph (8kph) impact
 - Motorcycle crash > 20 mph (32 kph) or with separation of rider and bike

21

Triage Decision Scheme

- **STEP 4: Underlying Conditions**
 - Age <5 or >55
 - Pregnancy
 - Immunosuppressed patients
 - Cardiac disease; respiratory disease
 - Insulin-dependent diabetes; cirrhosis; morbid obesity; coagulopathy

Wang TL. Concept of Triage

22

Is That Enough?

- A 45-year-old male with chest pain and cold sweating for 10 minutes, BP 130/80, PR 80, RR 18, BT 36.5, SpO2 97% → Triage?
- A 45-year-old male with chest pain and cold sweating for 10 minutes, BP 80/50, PR 130, RR 30, BT 35.6, SpO2 86% → Triage?

Disease Specific Triage (Risk Stratification)

Wang TL. Concept of Triage

23

Killip Classification

- Killip I: Rales and S3 absent
- Killip II: Rales over <50% of lung
- Killip III: Rales over >50% of lung fields (pulmonary edema)
- Killip IV: Shock
 - Subset I: Normal hemodynamics; PCWP<18; CI>2.2
 - Subset II: Pulmonary congestion: PCWP>18; CI<2.2
 - Subset III: Peripheral hypoperfusion; PCWP>18; CI>2.2
 - Subset IV: Pulmonary congestion and peripheral hypoperfusion; PCWP>18; CI<2.2

Wang TL. Concept of Triage

24

Ranson's criteria (alcoholic)

- **Admission**
 - Age > 55yr
 - WBC > 16,000/cmm
 - Glucose > 200 mg/dL
 - LDH > 350 IU/L
 - GOT > 250 IU/L
- **48 Hours**
 - Hct drop > 10%
 - PaO₂ < 60 mmHg
 - Ca < 8 mg/dL
 - Base deficit > 4 mEq/L
 - BUN rise > 5 mg/dL
 - Estimated fluid sequestration > 6L

Ranson's criteria (non-alcoholic)

- **Admission**
 - Age > 70yr
 - WBC > 18,000/cmm
 - Glucose > 220 mg/dL
 - LDH > 400 IU/L
 - GOT > 440 IU/L
- **48 Hours**
 - Hct drop > 10%
 - PaO₂ < 60 mmHg
 - Ca < 8 mg/dL
 - Base deficit > 5 mEq/L
 - BUN rise > 2 mg/dL
 - Estimated fluid sequestration > 6L

Prediction Model for Pneumonia

Patient characteristic	Points assigned
Demographic factors	
Age:	
o Males:	Age (in years)
o Females:	Age (in years) -10
Nursing home resident:	+10
Comorbid illnesses	
Neoplastic disease:	+30
Liver disease:	+20
Congestive heart failure:	+10
Cerebrovascular disease:	+10
Renal disease:	+10

Prediction Model for Pneumonia

Physical examination findings

Altered mental status:	+20
Respiratory rate 30/minute or more:	+20
Systolic blood pressure <90 mmHg:	+20
Temperature <35 degrees C or 40 degrees C or more:	+15
Pulse 125/minute or more:	+10

Prediction Model for Pneumonia

Laboratory findings	Points assigned
pH <7.35:	+30
BUN >10.7 mmol/L:	+20
Sodium <130 mEq/L:	+20
Glucose >13.9 mmol/L:	+10
Hematocrit <30 percent:	+10
PO ₂ <60 mmHg (2):	+10
Pleural effusion:	+10

(1) A risk score (total point score) for a given patient is obtained by summing the patient age in years (age minus 10 for females) and the points for each applicable patient characteristic.
 (2) Oxygen saturation <90 percent also was considered abnormal.

Risk Stratification for Pneumonia

Risk	Class	Algorithm
Low	I	Algorithm
Low	II	70 or fewer points
Low	III	71-90 total points
Moderate	IV	91-130 total points
High	V	>130 total points

Scoring System for SARS (SSSS)

- radiographic findings of multilobar or bilateral infiltrates (3 points)
 - sputum monocyte predominance (3 points)
 - lymphocytopenia (2 points)
 - history of exposure (1 point)
 - lactate dehydrogenase >450U/L (1 point)
 - C-reactive protein > 5.0mg/dL (1 point)
 - activated partial prothrombin time > 40sec (1 point)
- SSSS > 6 → probable SARS

Conclusion

- Triage is **Risk Stratification!**
- Triage is **Dynamic and Continuous!**
- **Disease-Specific Triage (Risk Stratification) is Indicated!**
- **The first year emergency residency training should be focused upon Triage!**

5-Tier Triage

Classification of Triage

- 2-level, 3-level, 4-level and 5-level triage
- Triage/Acuity/Diversion
 - CTAS (Canadian Triage and Acuity Scale)
- Acuity/Resource
 - ESI (Emergency Severity Index)

Classification of Triage

- 2-level, 3-level, 4-level and 5-level triage

2 levels	3 levels	4 levels	5 levels
Emergent Non-emergent	Emergent Urgent Nonurgent	Life-threatening Emergent Urgent Nonurgent	Resuscitation Emergent Urgent Nonurgent Referred

Classification of Triage

- 5-tier triage

System	Countries	Levels	Patient should be seen by provider within
Australasian Triage Scale (ATS) (formerly National Triage Scale of Australia)	Australia New Zealand	1 - Resuscitation	Level 1 - 0 minutes
		2 - Emergency	Level 2 - 10 minutes
		3 - Urgent	Level 3 - 30 minutes
		4 - Semi-urgent	Level 4 - 60 minutes
		5 - Nonurgent	Level 5 - 120 minutes
Manchester	England Scotland	1 - Immediate (red)	Level 1 - 0 minutes
		2 - Very urgent (orange)	Level 2 - 10 minutes
		3 - Urgent (yellow)	Level 3 - 60 minutes
		4 - Standard (green)	Level 4 - 120 minutes
		5 - Nonurgent (blue)	Level 5 - 240 minutes
Canadian Triage and Acuity Scale (CTAS)	Canada	1 - Resuscitation	Level 1 - 0 minutes
		2 - Emergent	Level 2 - 15 minutes
		3 - Urgent	Level 3 - 30 minutes
		4 - Less urgent	Level 4 - 60 minutes
		5 - Nonurgent	Level 5 - 120 minutes

(Australasian College for Emergency Medicine, 2002; Canadian Association of Emergency Physicians, 2002; Manchester Triage Group, 1997)

Example

- **Canadian Triage Acuity Scale (CTAS)**
 - Level 1 – Resuscitation: Any child or infant who requires continuous assessment and intervention to maintain physiological stability
 - Level 2 – Emergent: Any physiologically unstable child. Dehydration is difficult to accurately assess. Any suspicion (or evidence) should cause concern.
 - Level 3 – Urgent: Child or infant who is alert, oriented, well hydrated, minor alterations in vital signs.
 - Level 4 – Less Urgent: Alert child with fever and simple complaints such as ear pain, sore throat, or nasal congestion.
 - Level 5 – Nonurgent: Alert child who is afebrile, well hydrated w/ normal vital signs

Example

- **Pediatric Canadian Triage Acuity Scale (Paed CTAS)**



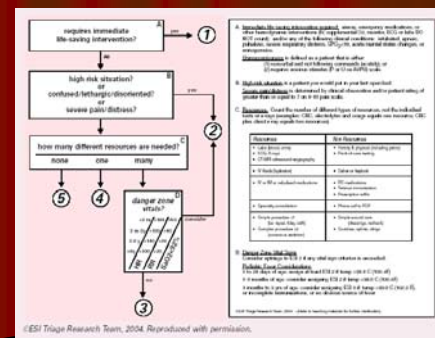
Example

- **Pediatric Canadian Triage Acuity Scale (Paed CTAS)**

Figure 1.2.8. Paediatric Presenting Conditions. Source: Canadian Paediatric Society. Canadian Journal of Emergency Medicine. Reproduced with permission.

Example

Emergency Severity Index (ESI)



Taiwan 5-Tier Triage

- Conducted by Taiwan Society of Emergency Medicine under grant from Department of Health
- Implemented on Jan 1st 2010
- Combined with payment from National Insurance Council
- Electronic Processing Assistance

Taiwan 5-Tier Triage

- **TTAS 5 (Taiwan Triage and Acuity Scale 5)**
 - Standardization
 - Find the right patients
 - Avoid under- or over-triage
 - Ensure patient safety and resource utilization
 - Establish reliable database and statistics
 - Software demonstration

TTAS檢傷級數

- 第一級 復甦急救(RESUSCITATION)
- 第二級 危急(EMERGENT)
- 第三級 緊急(URGENT)
- 第四級 次緊急(LESS URGENT)
- 第五級 非緊急(NOT URGENT)

TTAS檢傷級數

第一級 (復甦急救)

	病患常見表現	定義
安全候診時間 立即	心跳停止 休克 嚴重呼吸困難 意識狀態改變 GCS<=9 持續抽搐 到院前死亡	病況危急，生命或肢體需立即處置

TTAS檢傷級數

第二級 (危急)

	病患常見表現	定義
安全候診時間 10分鐘	心因性心絞痛 急性明顯吐血現象 收縮壓 > 200 或 舒張壓 > 110 伴隨呼吸困難症狀 嚴重中樞性疼痛(8-10) GCS(10-13) 急性或突然視覺改變	潛在性危急生命、肢體及器官功能狀況，需快速控制與處置

TTAS檢傷級數

第三級 (緊急)

	病患常見表現	定義
安全候診時間 30分鐘	心因性疼痛已緩解/有典型心因性病史 咖啡色嘔吐物或黑便 高血壓 (SBP > 200 或 DBP > 110) 沒有任何症狀 腹部(中樞)中度疼痛 (4 - 7) 抽搐後意識已恢復 輕度呼吸窘迫	病況可能持續惡化需要急診處置，病人可能伴隨明顯不適的症狀影響日常活動

TTAS檢傷級數

第四級 (次緊急)

	病患常見表現	定義
安全候診時間 60分鐘	局部蜂窩性組織炎 泌尿道症狀 急性咳嗽, 生命徵象正常 上肢(周邊)中度疼痛(4 - 7) 陰道點狀出血 輕度燒傷(<5%)	病況可能是慢性疾病的急性發作或某些疾病之合併症相關，需要在1-2小時做處置，以求恢復避免惡化

TTAS檢傷級數

第五級 (非緊急)

	病患常見表現	定義
安全候診時間 120分鐘	慢性咳嗽, 生命徵象正常 轉診 換藥 局部紅疹	病況為非緊急狀況，需做一些鑑別性的診斷或轉介門診以避免後續之惡化

TTAS檢傷級數判定程序

1. 快速視診/測量生命徵象
2. 依病患情形選擇最適當之主訴
3. 使用首要/次要調節變數來決定病患之急迫度



TTAS檢傷過程(Rationale)



TTAS檢傷級數判定程序

一、快速視診/測量生命徵象

- 所有出現心肺死亡或嚴重呼吸窘迫，休克或無意識的病人到達檢傷現場應立即送入急救室-檢傷記錄可稍後登錄。
- 明顯不穩定的病患如中度呼吸窘迫，血行動力不佳或意識改變應送至治療區，並在床邊完成檢傷。
- 明顯穩定的病人應在檢傷區完成檢傷。

TTAS檢傷級數判定程序

二、選擇最適當之主訴

- TTAS分為非外傷和外傷兩大系統：
- 非外傷系統分14大類，共132個主訴。
- 外傷系統分15大類，共47個主訴。

TTAS檢傷級數判定程序

三、使用調節變數

- 呼吸窘迫 ---- Airway
- ---- Breathing
- 血行動力 ---- Circulation
- 意識程度 ---- Disability
- 體溫
- 疼痛程度
- 受傷機制 (外傷病患使用)

TTAS檢傷級數判定程序

調節變數 1-呼吸窘迫

等級	病人描述	血氧濃度	TTAS 級數
嚴重	過度的呼吸工作而產生疲憊現象，發紺，只能說單字或不能說話，上呼吸道阻塞，嗜睡或混亂	<90%	1
中度	呼吸工作增加，使用呼吸輔助肌，只能使用片語或短句，明顯或惡化的喘鳴呼吸聲，但呼吸道反射功能仍存在。	<92%	2
輕度	呼吸困難，心跳過速，在走動時有呼吸急促的現象，沒有明顯呼吸工作的增加，可使用句子表達語言，有喘鳴呼吸聲但沒有任何呼吸道阻塞情形	92%-94%	3

TTAS檢傷級數判定程序

調節變數 2-血行動力

血行動力狀態	TTAS級數
休克：症狀顯示器官組織嚴重灌流不足（臉色蒼白、皮膚冰冷、冒汗、微弱的脈搏、低血壓、姿勢性昏厥、明顯心悸過速或過緩、無效的換氣或明顯缺氧、意識程度下降）。【敗血性休克時也可能呈現臉潮紅、發熱的毒性外觀】	1
血行動力循環不足：未出現休克徵象，但血液灌流處於邊緣狀態或生命徵象異常（蒼白、冒汗、無法解釋的心跳過速、姿勢性低血壓），【在站立、坐著時頭暈之病史】或疑似低血壓【低於病人正常的血壓或比病人預期的血壓低】。	2
病人生命徵象正常或正常邊緣，特別是如果與平常的正常值不同時。	3
生命徵象正常	4 & 5

TTAS檢傷級數判定程序

調節變數 3-意識程度

意識程度狀態	GCS昏迷指數	TTAS級數
無意識＝無法保護呼吸道，對疼痛或大聲的叫喚出現無意義的反應動作（如：不正常的姿勢或戒斷動作），持續抽搐，意識程度漸進性惡化。	3-8	1
意識改變＝用語時不適當的語言表達（只能指出痛點，講話含糊不清）；人、時、地的定向感不清（混亂）；近期記憶喪失（健忘）；行為異常（激動、不安）。	9-13	2
正常；但應使用其他變項判定級數	14-15	3,4 & 5

TTAS檢傷級數判定程序

調節變數 4-體溫

發燒>38.0 °C (成人>=16歲)	TTAS級數
免疫功能不全： 白血球過低、移植後的病人、或長期使用類固醇	2
看起來有敗血性休克(血液循環灌流不足)	2
看起來有病容	3
看起來無病容	4

體溫絕對值 (檢傷第一級) >41°C 或 <32 °C

TTAS檢傷級數判定程序

調節變數 5-疼痛嚴重度

疼痛量表(使用十分量表)	疼痛程度及疼痛分數	疼痛部位	TTAS級數
□ 分中樞和周邊	嚴重 (8-10)	中樞	2
□ *中樞型疼痛:指源自於體腔(頭、腹部)或器官(眼、睾丸、深層軟組織)的疼痛，可能伴隨著危及生命的情況，包括:缺血(急性冠狀動脈症候群、主動脈剝離、華九扭轉)、阻塞膨脹(青光眼、腸阻塞)、刺激性(蜘蛛膜下腔出血、腸穿孔)及感染性(壞死性筋膜炎、頸部深部感染)。		周邊	3
□ *周邊型疼痛:指的是源自於皮膚、軟組織、骨骼或表層器官的表皮(眼、耳、鼻)，包括:皮膚撕裂傷或擦傷、挫傷、骨折(腕、肋骨)及異物(眼、耳、鼻)	中度 (4-7)	中樞	3
		周邊	4
	輕度 (0-3)	中樞	4
		周邊	5

TTAS檢傷級數判定程序

調節變數 6-受傷機轉

- 因高危險性受傷機轉引起的創傷直接判定為檢傷 2級
- 低危險性受傷機轉需和其他判定條件一起評估

TTAS檢傷級數判定程序

受傷機轉	高危險性受傷機轉(檢傷2級)
一般創傷	1. 汽機車車輛 2. 行人或腳踏車被汽車撞倒 3. 由大於6公尺高度跌落。 4. 任何受傷在頭部、頸部、軀幹、或靠近手肘和膝蓋處的穿創傷。 5. 槍傷
頭部創傷	1. 車輛被拋出車外 2. 行人被車輛撞倒。 3. 由大於1公尺或5階梯高跌落 4. 被人使用鈍器攻擊 (拳腳除外)
頸部創傷	1. 汽機車車輛 2. 由大於1公尺或5階梯高跌落。 3. 頭部被空直接擊者。

TTAS檢傷可能衍生問題

- Under-Triage
 - Esp. for Those without Adequate Compensation Mechanisms
 - Difficulties between Triage I and II
- Negative Impact on Efficiency
 - D2B Time
 - Fibrinolytics for New-Onset Ischemic Stroke

Case 1

- A 70 year-old male complains of general weakness for 1 day.
- Vital signs: BP 112/70 mmHg, PR 61 bpm, RR 22/min, BT 39.9°C, SpO2 95%. GCS E4M6V5
- PMH: Hypertension with medications

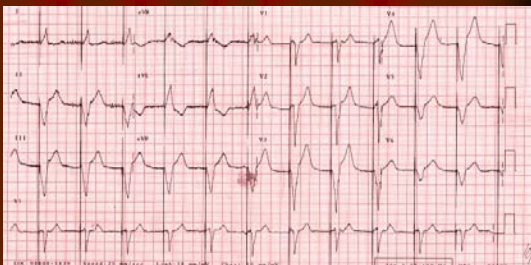
Case 1

- Different vital signs should be integrated together instead of reading separately!
- Everyone's normal range may not be the individual's "normal range".
- In case 1, TTAS II → Should be modified as **Triage I**

Case 2

- A 77 year-old female has been noted tarry stool for 1 day.
- Vital signs: BP 106/78 mmHg, PR 69 bpm, RR 24/min, BT 36.2°C, SpO2 96%. GCS E3M6V3-4
- PMH:
 - Dementia for 5 years
 - some kind of heart problem (according to her Indonesia care-giver)

Case 2

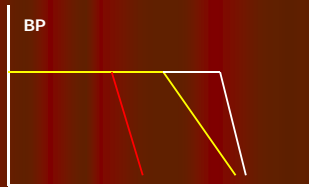


Case 2

- Those who lack adequate compensation mechanisms
 - Known sympathovagal imbalance
 - Diabetes: sympathovagal imbalance
 - Drugs: Beta-adrenergic agents
 - Extreme elderly
 - Pacemaker for symptomatic bradycardia
 - Heart transplant recipients

Case 2

- Those who have too good compensation mechanisms
 - Little kids
 - Athlete



Wang TL. Concept of Triage

67

Triage Decision Scheme (Trauma)

- **STEP 1: Measure Vital Signs and Level of Consciousness**
 - GCS<14
 - SBP<90
 - RR<10 or >29 (<20 for infant less than 1y)
 - RTS<11
 - PTS<9

Wang TL. Concept of Triage

68

Triage Decision Scheme

- **STEP 2: Anatomic and Physiologic Approach**
 - All penetrating injuries to head, neck, torso, and extremities proximal to elbow and knee
 - Flail chest
 - Two or more proximal long-bone fractures
 - Crush, degloved, or mangled extremity
 - Amputation proximal wrist/ankle
 - Pelvic fractures
 - Open and depressed skull fractures
 - Limb paralysis
 - Combined with burn

Wang TL. Concept of Triage

69

Triage Decision Scheme

- **STEP 3: Trauma Mechanisms**
 - Falls
 - Adults: >20 ft (1 story = 10 ft)
 - Children: >10 ft or 2 or 3 times the height of the child
 - High-risk auto crash
 - Intrusion into passenger compartment >12 inches (30cm); occupant site: > 18 in, any site
 - Major auto deformity >20 inches (50cm)
 - Extrication time > 20 minutes
 - Ejection (partial or complete) from auto
 - Death in same passenger compartment
 - Vehicle telemetry data consistent with high risk of injury (Initial speed >40mph (64 kph))
 - Auto vs. Pedestrian / bicyclist thrown, run over, or with significant (>20 mph) impact
 - Auto-pedestrian injury with > 5mph (8kph) impact
 - Motorcycle crash > 20 mph (32 kph) or with separation of rider and bike

Wang TL. Concept of Triage

70

Triage Decision Scheme

- **STEP 4: Special Patient or System Considerations**
 - Age
 - Older adults: Risk of injury / death increases after age 55
 - Children: Should be triaged preferentially to pediatric-capable trauma centers (<5 y)
 - Anticoagulant and bleeding disorders
 - Time-sensitive extremity injury
 - Pregnancy >20 wks
 - EMS provider judgment
 - End-stage renal disease requiring dialysis
 - Immunosuppressed patients
 - Cardiac disease; respiratory disease
 - Insulin-dependent diabetes; cirrhosis; morbid obesity

Wang TL. Concept of Triage

71

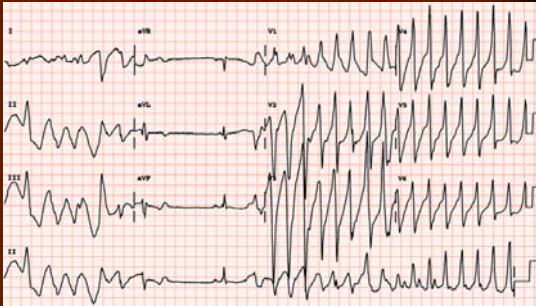
Case 3

- A 26-year-old female has found falling down 20 minutes ago. She regained consciousness 3 minutes later.
- Vital signs: BP 120/68, PR 62, RR 20, BT 35.8, SpO2 98% GCS E4M6V5
- PMH: PID/leukorrhea under treatment

Wang TL. Concept of Triage

72

Case 3



Wang TL. Concept of Triage

73

Case 3

● Long QT syndrome (LQTS)

Type of LQTS	Chromosomal Locus	Mutated Gene	Ion Current Affected
LQT1	11p15.5	KVLQT1, or KCNQ1 (heterozygotes)	Potassium (I_{Kr})
LQT2	7q35-36	HERG, KCNH2	Potassium (I_{Kr})
LQT3	3p21-24	SCN5A	Sodium (I_{Na})
LQT4	4q25-27	ANKK2, ANKB	Sodium, potassium and calcium
LQT5	21q22.1-22.2	KCNH1 (heterozygotes)	Potassium (I_{Kr})
LQT6	21q22.1-22.2	MRP1, KCNC2	Potassium (I_{Kr})
LQT7 (Anderson syndrome)	17q23.1-q24.2	KCNJ2	Potassium (I_{Kr})
LQT8 (Timothy syndrome)	12q13.3	CACNA1C	Calcium (الكالسيوم)
LQT9	3p25.3	CAV3	Sodium (I_{Na})
LQT10	11q23.3	SCN4B	Sodium (I_{Na})
LQT11	7q21-q22	AKAP9	Potassium (I_{Kr})
LQT12		SNTA1	Sodium (I_{Na})
JLN1	11p15.5	KVLQT1, or KCNQ1 (homozygotes)	Potassium (I_{Kr})
JLN2	21q22.1-22.2	KCNH1 (homozygotes)	Potassium (I_{Kr})

Wang TL. Concept of Triage

74

Case 3

● Acquired long QT

- Antibiotics
- Antidepressants
- Antifungals
- Antihistamines
- Diuretics
- Heart medications
- Lipid-lowering medications
- Oral hypoglycemics (for diabetes)
- Psychotropic medications

Wang TL. Concept of Triage

75

Case 3

● Medications that triggers TdP in inherited LQTS

- Appetite suppressants
- Bronchodilators
- Catecholamines
- Certain common antibiotics (e.g., erythromycin)
- Decongestants
- Uterine relaxants
- Vasoconstrictors

Wang TL. Concept of Triage

76

Case 3

● Conscious Change

- GCS 14-15 → TTAS Triage III-V
- GCS 9-13 → TTAS Triage II
- GCS 3-8 → TTAS Triage I

● Syncope right now or just before

- Always implicates **Triage I**
 - TTAS Triage III-V (can be modified as Triage I)

Wang TL. Concept of Triage

77

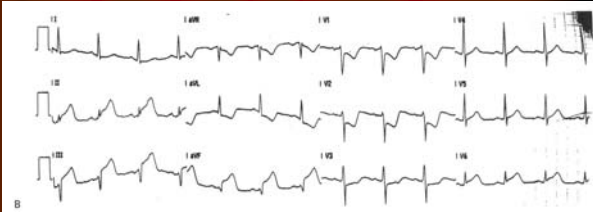
Case 4

- A 45-year-old male complains of chest pain and cold sweating for 30 minutes
- Vital signs: BP 140/82, PR 80, RR 18, BT 36.5, SpO2 97% GCS E4M6V5
- PMH: smoking

Wang TL. Concept of Triage

78

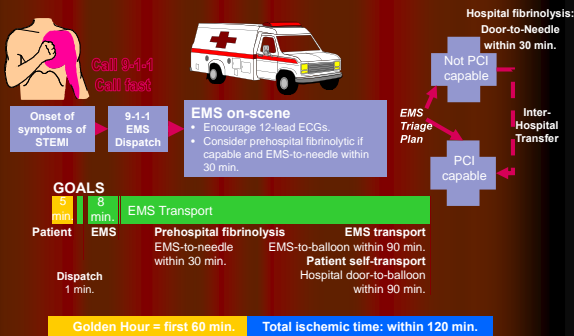
Case 4



Case 4



Options for Transport of Patients With STEMI and Initial Reperfusion Treatment



Case 4

- **Role of Emergency Physician on STEMI**
 - **Prompt and Correct Diagnosis**
 - Atypical presentations: DM, Female, Elderly, medical modifications
 - Unusual ECG findings: hyperacute T, BBB
 - **Successful Resuscitation for Witnessed VF/VT (Cardiac Arrest)**
 - Peak of VF/VT vs. AMI
 - **Always implicates Triage I**
 - TTAS Triage II (can be modified as Triage I)

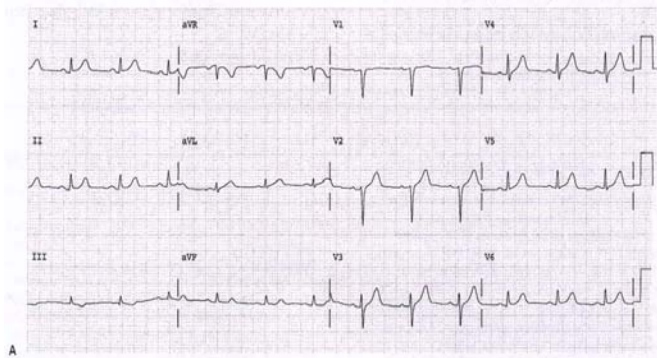
Case 4

- **Role of Cold Sweating**
 - Excess Activation of Sympathetic Tone
 - Extreme Physical Stress
 - Atypical Presentations: Masking by Underlying Conditions or Medications
 - Always implicates Triage I
 - TTAS Triage II (can be modified as Triage I)

Case 5

- A 60-year-old female complains sudden onset of epigastralgia 30 minutes ago
- Vital signs: BP 126/74, PR 75, RR 22, BT 36.3, SpO2 95% GCS E4M6V5
- PMH: diabetes under OHA for 7 years

Case 5



Case 5

- Unusual presentations
 - Sudden onset
 - Severe symptoms that never experienced
 - Extreme gaps between symptoms and signs
 - Sense of dying (or end of the world)
 - Illusion or hallucination of ghosts / gods
- Esp. in
 - those with atypical presentations
 - Low socio-economic status or special culture background

Wang TL. Concept of Triage

86

Case 6

- A 25-year-old female complains gradual onset of headache and general weakness for 1 hour. She found her cat also sick.
- Vital signs: BP 98/54, PR 98, RR 22, BT 36.3, SpO2 98% GCS E4M6V5
- PMH: Nil

CO Intoxication

Wang TL. Concept of Triage

87

Case 6

- Limitations for Pulse Oximetry
 - motion artifact
 - abnormal hemoglobins (primarily carboxyhemoglobin [COHb] and met-hemoglobin [metHb])
 - intravascular dyes
 - exposure of measuring probe to ambient light during measurement
 - low perfusion states
 - skin pigmentation
 - nail polish or nail coverings with finger probe
 - inability to detect saturations below 83% with the same degree of accuracy and precision seen at higher saturations
 - inability to quantitate the degree of hyperoxemia present
 - Hyperbilirubinemia has been shown NOT to affect the accuracy of SpO2 readings

Wang TL. Concept of Triage

88

Case 6

- Hypoxia
 - Hypoxemia (reduced arterial oxygen content)
 - a. Reduced PaO2
 - b. Reduced SaO2
 - c. Reduced hemoglobin content (anemia)
 - Reduced oxygen delivery
 - a. Reduced cardiac output
 - b. Lefttoright systemic shunt (e.g., septic shock)
 - Decreased tissue oxygen uptake
 - a. Mitochondrial poisoning (e.g., cyanide)
 - b. Leftshifted hemoglobin dissociation curve (e.g., abnormal hemoglobin structure)

Wang TL. Concept of Triage

89

Case 7

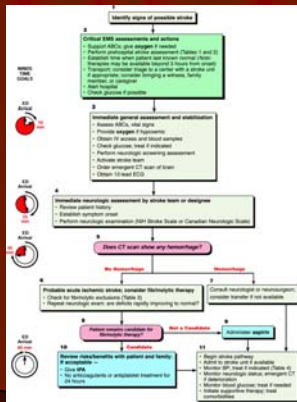
- A 68-year-old male was noted to have acute onset of right-sided weakness and speech difficulty 45 minutes ago.
- Vital signs: BP 170/122, PR 64, RR 22, BT 36.0°C, SpO2 96% GCS E4M6V5
- PMH: Nil

Wang TL. Concept of Triage

90

Case 7

Seven D's



Circulation 2005;112:IV-111-IV-120



Case 8

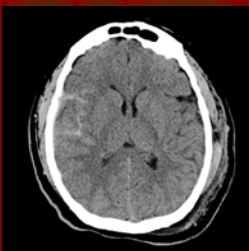
- A 21-year-old female complains sudden onset of severe headache (grade 10/10) for 1 hour.
- Vital signs: BP 140/96, PR 70, RR 24, BT 36.5°C, SpO2 98% GCS E4M6V5
- PMH: Nil

Wang TL. Concept of Triage

92

Case 8

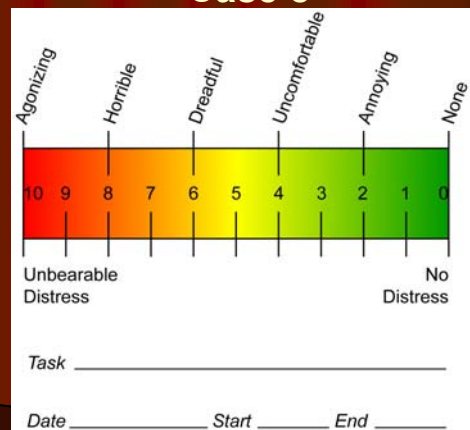
Pain Scale is Usually Under-estimated!



Wang TL. Concept of Triage

93

Case 8



94

Case 8

- Life-Threatening Pain
 - AMI, DAA, PE, Cardiac Tamponade, Tension Pneumothorax, Esophageal Rupture
 - Hollow organ perforation, SMA Occlusion, Internal Hernia
 - Necrotizing Fasciitis
 - SAH
- Organ-Threatening Pain
 - Glaucoma
 - PAOD

Wang TL. Concept of Triage

95

Case 9

- A 45-year-old female was injured by her husband 1 hour ago. Multiple bruising over her trunk and left forearm deformity were noted.
- Vital signs: BP 122/68, PR 95, RR 22, BT 35.6°C, SpO2 98% GCS E4M6V5
- PMH: Nil

Wang TL. Concept of Triage

96

Case 9

- **Social Indication as Triage I**
 - Domestic Violence
 - Child Abuse
 - Sexual Assault
 - Attempted Homicide
- **Highly Clinical Suspicion**
- **Usually Under-triaged**

Case 9

- **Child Abuse**
 - **Screening**
 - More than 3 episodes of trauma from ED recordings
 - Inconsistent medical history
 - Inconsistency between history and physical findings
 - Delayed transportation / consultation
 - Any fracture or head injury for those < 1y

Case 9

- **Child Abuse**
 - **Physical Findings**
 - Skin: Blunt Injury, Burn, Bite
 - Face: Raccoon Eye, ENT, Teeth, Lip, Hair
 - Head: Abusive Head Injury, Shaken Baby
 - Abdomen: Liver Laceration, Duodenal Hematoma, Traumatic Pancreatitis, Mesentery Laceration
 - **Fracture:**
 - Much younger; Multiple; Varying stages; Spiral or Oblique
 - Eg: post. ribs; scapula; sternum; complex skull

Case 9

- **Child Abuse**
 - **High Specificity (for example)**
 - Metaphyseal fractures
 - Rib fractures
 - Scapular fractures
 - Fractures of the outer end of the clavicle
 - Fractures of differing ages
 - Vertebral fractures or subluxation
 - Digital injuries in non-mobile children
 - Bilateral skull fractures
 - Complex skull fractures

Case 10

- **A 70-year-old patient was transferred to our ED under the diagnosis of ACS. His present chief complaint is SOB for more than 2 days (R1 recorded). He consulted another ED and has gotten the treatment of Clexane for 2 days.**
- **BP 136/72, PR 100/min, RR 18/min, SpO2 97%, GCS E4M6V5**
- **PMH: Hypertension**

Case 10



Case 10

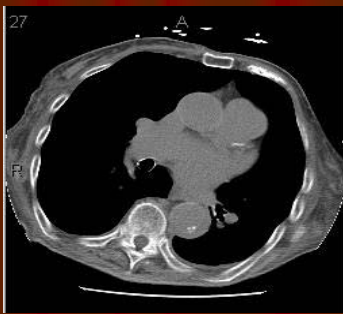
- MONA
- ECG Monitoring
- Continue Bokey, Clexane

Case 10

- Review his history, sudden-onset unexperienced chest pain that radiated from anterior chest to middle back with cold sweating was noted initially 3 days ago.

TTAS III -> I

Case 10



Case 10



Crescent Sign

Case 10

- Inter-Hospital Transfer
 - Usually treated as Triage I
 - Over-triage rather than Under-triage
- Complete history taking
 - From the very beginning
 - Chief complaint at the 1st visit
 - Complete exclusion or NOT
 - Life-threatening chest pain
 - ACS
 - DAA
 - PE
 - Tension pneumothorax
 - Cardiac tamponade
 - Esophageal rupture

Case 11

- A 63-year-old male suffered from sudden onset of left eye blindness.
- BP 158/92, PR 84/min, RR 20/min, SpO2 96%, GCS E4M6V5
- PMH: DM and Hypertension for 10 years

TTAS?

Case 11

- Amaurosis Fugax
 - Embolic and hemodynamic origin
 - Atherosclerotic carotid artery
 - Atherosclerotic ophthalmic artery
 - Cardiac emboli due to (1) atrial fibrillation, (2) valvular abnormalities including post-rheumatic valvular disease, mitral valve prolapse, and a bicuspid aortic valve, and (3) atrial myxomas.
 - Temporary vasospasm
 - Giant cell arteritis
 - Systemic lupus erythematosus
 - Periarthritis nodosa
 - Eosinophilic vasculitis
 - Hyperviscosity syndrome
 - Polycythemia
 - Hypercoagulability
 - Protein C deficiency
 - Antiphospholipid antibodies
 - Anticardiolipin antibodies
 - Lupus anticoagulant
 - Thrombocytosis
 - Subclavian steal syndrome
 - Malignant hypertension
 - Drug abuse-related intravascular emboli
 - Iatrogenic

Wang TL. Concept of Triage

109

Case 11

- Amaurosis Fugax
 - Ocular origin
 - Iritis
 - Keratitis
 - Blepharitis
 - Optic disc drusen
 - Posterior vitreous detachment
 - Closed-angle glaucoma
 - Transient elevation of intraocular pressure
 - Intraocular hemorrhage
 - Coloboma
 - Myopia
 - Orbital hemangioma
 - Orbital osteoma
 - Keratoconjunctivitis sicca
 - Neurological origin
 - Optic neuritis
 - Compressive optic neuropathies
 - Papilledema
 - Multiple Sclerosis
 - Migraine
 - Pseudotumor cerebri
 - Intracranial tumor
 - Psychogenic

Wang TL. Concept of Triage

110

Case 12

- A 12-year-old boy was sent to ED due to progressive dyspnea for several hours. He was just discharged 1 week ago after successful extubation.
- BP 110/66, PR 120/min, RR 28/min, SpO2 92%, GCS E4M6V5. No wheezing
- PMH: Asthma

Wang TL. Concept of Triage

111



Development of a Symptom Severity Index

Symptom Frequency	Severe Persistent	Moderate Persistent	Mild Persistent	Mild Intermittent
During the day	3 times/day	Everyday (less than/equal to 2 x/day)	At least twice/week	Less than twice/week
At night	Everyday/most days	At least twice/week	At least twice/month	Less than twice/month
Episodes frequency	---	Everyday	At least twice/week	Once a week/less
Exercise induced	---	Everyday	At least twice/week	Once a week/less
Symptoms/week	21 times/week	7 times/week	3-6 times/week	2 times/week or less

Asthma Severity

Factor	Severe asthma (FEV ₁ <1.0 L)
Pulse rate (beats/min)	≥120, but may be less with equally severe asthma
Respiratory rate (breaths/min)	≥40, but most are >20, therefore nondiscriminating
Pulsus paradoxus (mm Hg)	≥10, but may be absent with equally severe asthma in 50% of cases
Pulse rate ≥120, respiratory rate ≥20, pulsus paradoxus ≥10	If all three abnormal, 90% with severe asthma, but only 40% with FEV ₁ <1.0 L have all three abnormal
Use of accessory muscles of respiration	If present, may indicate severe asthma; if absent, may have equally severe asthma in 50% of cases
ABG analysis (mm Hg)	PaO ₂ ≤60 or PaCO ₂ ≥42 indicates severe asthma; all other values difficult to interpret unless PEFR or FEV ₁ known
Pulmonary function studies	PEFR and FEV ₁ measure directly the degree of airflow obstruction; most useful in assessing severity and guiding treatment decisions

Wang TL. Concept of Triage

113

Asthma Severity

1. Past history of sudden severe exacerbations
2. Prior intubation for asthma
3. Prior asthma admission to an intensive care unit
4. Two or more hospitalizations for asthma in the past year
5. Three or more ED care visits for asthma in the past year
6. Hospitalization or an ED care visit for asthma within the past month
7. Use of >2 MDI short-acting β₂ agonist canisters per month
8. Current use of or recent withdrawal from systemic corticosteroids
9. Difficulty perceiving severity of airflow obstruction
10. Comorbidities such as cardiovascular diseases or other systemic problems
11. Serious psychiatric disease or psychosocial problems
12. Illicit drug use, especially inhaled cocaine and heroin

Wang TL. Concept of Triage

114

5-Tier READ Triage

- **TTAS by Triage Nurses**
 - Can modify according to clinical judgment
- **Re-triage by Emergency Physicians**
 - Register in HIS system
 - 1st re-triage should NOT be lower than TTAS
- **Dynamic Triage: (color codes as internationally designed)**
 - Triage I: **Red**
 - Triage II: **Orange**
 - Triage III: **Yellow**
 - Triage IV: **Green**
 - Triage V: **Blue**
 - **Changing Triage should be treated as an Order!**

Thanks for Your Attention!