Improving healthcare outcomes in the era of pay-for-value: Empirical examples from Taiwan

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OUTLINES

- Paradigm shift: pay-by(for)-value Survival X (2nd function): costs (including out-of-pocket pay) quality of life functional disability, etc. • Practical example(s): **Prolonged mechanical ventilation** (Methadone treatment for heroin users)
- (Declaration of interest: My team only receive funding support from the Ministry of Science and Technology of Taiwan)

Redefining health care重新定義健康照護 (2006):by Michael Porter and Elizabeth Teisberg(中文翻譯:醫療革命,黃達夫基金會)

 Value is the outcome per dollar spent in providing services, and outcome includes not only survival but also quality of life and functional impairments, etc.(New Engl J Med 2009;361:109-12)

• Standardization of outcome measurements (New Engl J Med 2016;374:504-6)

ICHOM – International Consortium for Health Outcomes Measurement An elderly suffering from loss of consciousness after falling down

□ Age: 89

- □ Comatose, E₁V₁M₁
- Subdural hematoma (by computed tomography), respiratory distress
- Pupils not yet dilated

Comorbid with diabetes (40+ yrs), hypertension (25 yrs), Parkinson's disease, prostate cancer, old stroke

Clinical decisions:

To operate or not (craniotomy to treat the hematoma)?
 Would the patient regain consciousness after operation?
 Should he be continued

mechanical ventilation, if he were still comatose after operation?

PMV (prolonged mechanical ventilation)

- □ <u>After 2005 (U.S.A.)</u>
 - \geq 21 days of mechanical ventilation for at least six hours per day
- \Box 10% of MV patients \rightarrow PMV
 - consume up to **40%** of ICU patient days
- In Medicare patients received PMV
 - Total charges: 3rd
 - Charges per patient: 1st

Carson SS. Current Opinion in Critical Care, 2006

Integrated delivery service to relieve traffic jams of hospitalization into ICU ward due to PMV





呼吸照護中心 (Respiratory Care Center)



Weaning of respirator

Respiratory Care Ward (ventilator dependent)



Cost per QALY (quality-adjusted life year) and lifetime cost of prolonged mechanical ventilation in Taiwan

Hung et al. PLoS One 2012; 7: e44043 & others

Quality of life (Qual Life Res 2010; 19:721-727) Life expectancy (Crit Care 2011; 15:R107) Improved survival (Respir Care 2013; 58:517-524) Cancer (Crit Care 2013; 17(4):R144) Summary(台灣醫界 2016年三月(59卷第3期) 40-43)

Specific diseases	No. of cases	Life expectancy (Years) (SE)	QALE (QALY)(SE)		Lifetime cost (\$US) for treatment		Cost per QALY	
			partial cognition	poor cognition	NHI	Out of pocket	partial cognition	poor cognition
Cancer	5,367	1.49 (0.08)	0.46 (0.08)	0.20(0.03)	15,835	13,931	64,708	148,829
Chronic renal failure	2,032	1.32 (0.12)	0.40 (0.09)	0.18(0.04)	24,253	12,237	91,224	202,720
Liver cirrhosis	1,478	3.50 (0.37)	1.15 (0.22)	0.50(0.13)	19,652	32,568	45,409	104,440
Parkinson's disease	341	2.01 (0.27)	0.59 (0.14)	0.26(0.07)	44,708	17,461	105,371	239,110
Degenerative nervous disease	378	4.08 (0.60)	1.28 (0.25)	0.56(0.14)	78,622	36,898	90,250	206,286
Stroke	6,765	3.32 (0.13)	1.05 (0.20)	0.46(0.09)	42,452	29,932	68,938	157,358
Injury or poisoning	4,955	6.19 (0.17)	2.04 (0.39)	0.89(0.18)	43,090	56,806	48,969	112,242
Hung et al. PLoS One 2012; (DOI: 10.1371/journal.pone.0044043)								

	No. of cases	Life expectancy (Years)	QALE (QALY) (SE)		Lifetime cost (\$US) for treatment		Cost per QALY	
		(SE)	partial cognition	poor cognition	NHI	Out of pocket	partial cognition	poor cognitio n
<65 yrs								
Heart diseases	616	4.97 (0.63)	1.61 (0.41)	0.70 (0.19)	47,230	45,463	57,574	132,419
Septicae mia/ Shock	919	4.42 (0.59)	1.22 (0.23)	0.64 (0.14)	27,797	40,663	56,115	106,969
Urinary tract infections / Shock	197	4.77 (0.98)	1.43 (0.35)	0.62 (0.18)	54,799	43,487	68,731	158,525
COPD	1788	5.18 (0.28)	1.66 (0.24)	0.72 (0.14)	59,284	46,875	63,951	147,444

Policy changes for PMV (great efforts of Mr. Huang HS)

• Amendment of law, (January 26, 2011)

"Hospice Palliative Care Regulation"

allowing extubation under signatures of all family members

- Further amendment on article 7 (January 9, 2013) to allow extubation under condition of:
 - 1. diagnosed as terminal by 2 physicians
 - 2. signature of one closest relative if unconscious

Costs and No. prolonged mechanical ventilation



Take home messages

 For comatose & ventilator dependent patients (>3 weeks), determine:

Is it a terminal case of the underlying diseases? (Ask two specialists)

- Inform patient's family about life expectancy & out-of-pocket payment associated with PMV
- Advance care planning

Opioid agonist treatment for heroin users (Chang et al. Drug & alcohol dependence 2019:197-204)

- 1283 heroin users (2006–2014)
- EQ-5D measured for quality of life (n=349)
- Utility of those receiving treatment 0.23 higher than no treatment
- Quality-adjusted life expectancy 9.7 QALY higher than those without treatment
 Methadone & buprenorphine save lives





The transformation of the cross-sectional sampling to dynamic change of quality of life (QOL) (ex: QOL of heroin users receiving methadone treatment)

Chang et al. Drug and Alcohol Dependence 2019



利用生命表法,估計終身調整生活品質後存活時間 (QAST, quality-adjusted survival time)

時間 區間	失去 追蹤 人數	生存 數	死亡 數	時間 區間 人 數	風險 暴露 人數	條件 化死 亡比	條件 化存 活比	累積存活 比	生活品 質 QOL(ti)	QAS T
$t_1 - t_2$ $t_2 - t_3$	l_1 l_2	W1 W2	d_1 d_2 .	<i>n</i> ' ₁ <i>n</i> ' ₂	N1 N2	$\hat{q}_1 \ \hat{q}_2$.	$\hat{p}_1 \ \hat{p}_2$.	$\hat{s}(t_1) = 1.00$ $\hat{s}(t_2)$) $qol(t_1)$ $qol(t_2)$	QS_1 QS_2
ti — ti + 1	li	Wi	di	<i>n</i> 'i	Ni	· \hat{q}_i .		ŝ(ti)	qol(ti)	QSi
$\frac{t_{s-1}-t_s}{t_s-\infty}$	l_{s-1} ls	Ws – 1 Ws	$\frac{ds-1}{ds}$	$\frac{n's-1}{n's}$	Ns – 1 Ns	• \hat{q}_{s-1} 1	\hat{p}_{s-1}	$\hat{s}(t_{s}-1)$ $\hat{s}(t_{s})$	$. qol(t_{s-1}) qol(t_{s})$	OS_{S-1} QSs

QOL may be replaced by costs, proportion of funct. disability



Chang et al. Drug and Alcohol Dependence 2019



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Time trends of costs paid by National Health Insurance for 5 top catastrophic illnesses in Taiwan

