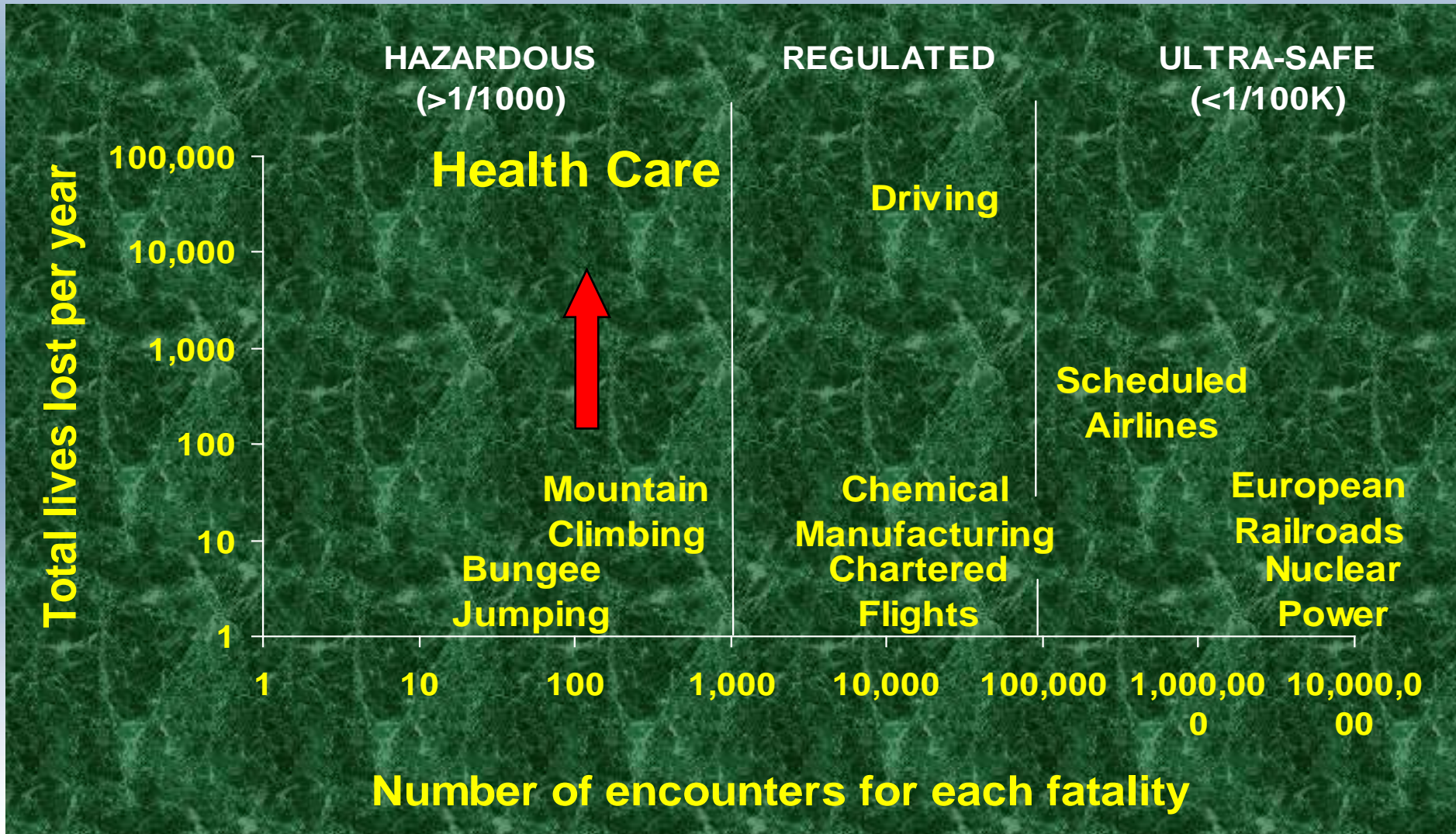


HAP/VAP care bundle interventions - a UK approach

Dr R G Masterton
NHS Ayrshire & Arran

How Hazardous Is Health Care?

(Leape and Amalberti)



Healthcare Quality Strategy

- 3 Quality Ambitions

- Mutually beneficial partnerships between patients, their families and those delivering healthcare services. Partnerships which respect individual needs and values and which demonstrate compassion, continuity, clear communication and shared decision-making.
- No avoidable injury or harm from the healthcare they receive, and that they are cared for in an appropriate, clean and safe environment at all times.
- The most appropriate treatments, interventions, support and services will be provided at the right time to everyone who will benefit, with no wasteful or harmful variation.

Healthcare Quality Strategy

- 3 Quality Ambitions

- Mutually beneficial partnerships between patients, their families and carers. Partnerships with values clear and where communication and shared decision-making.

Person centred

- No avoidable harm. They receive clean and safe care that is appropriate,

Harm

- The most appropriate treatments, interventions, support and services for everyone who use them. No variation.

Waste & Variation

Quality Measurement Framework

1

Quality Outcome Measures

2

HEAT

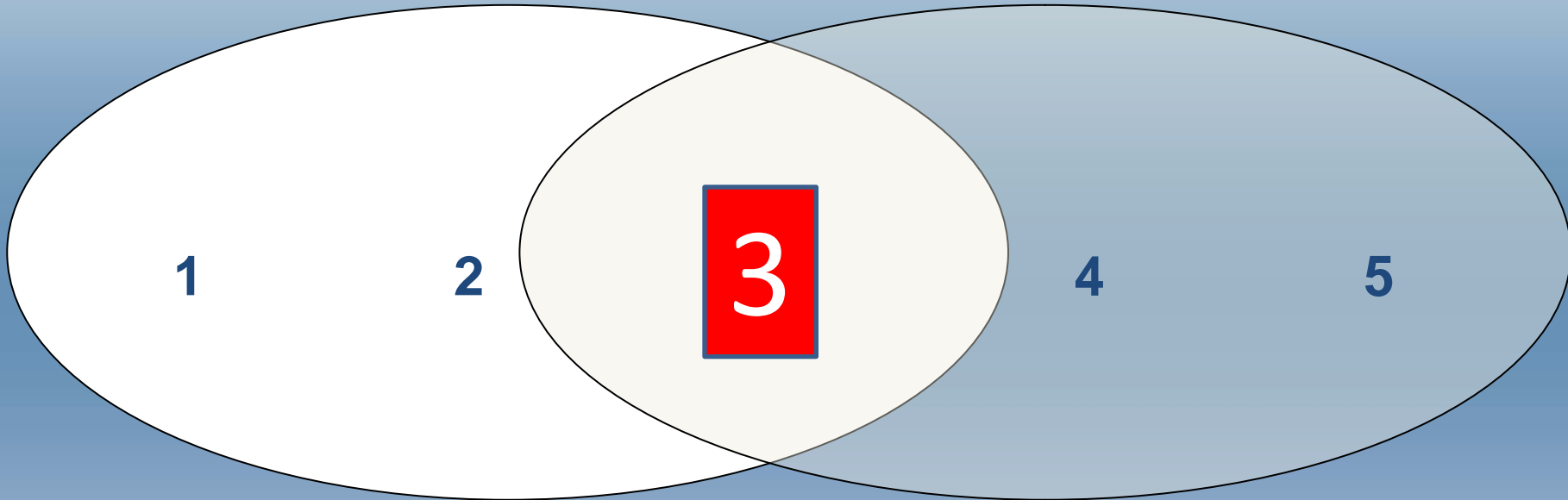
3

Supporting local and national quality indicators

Healthcare Quality & Cost

QUALITY INITIATIVES

COST REDUCTION PROGRAMMES



Costs more

Cost neutral

**Improves quality
reduces costs**

Quality neutral

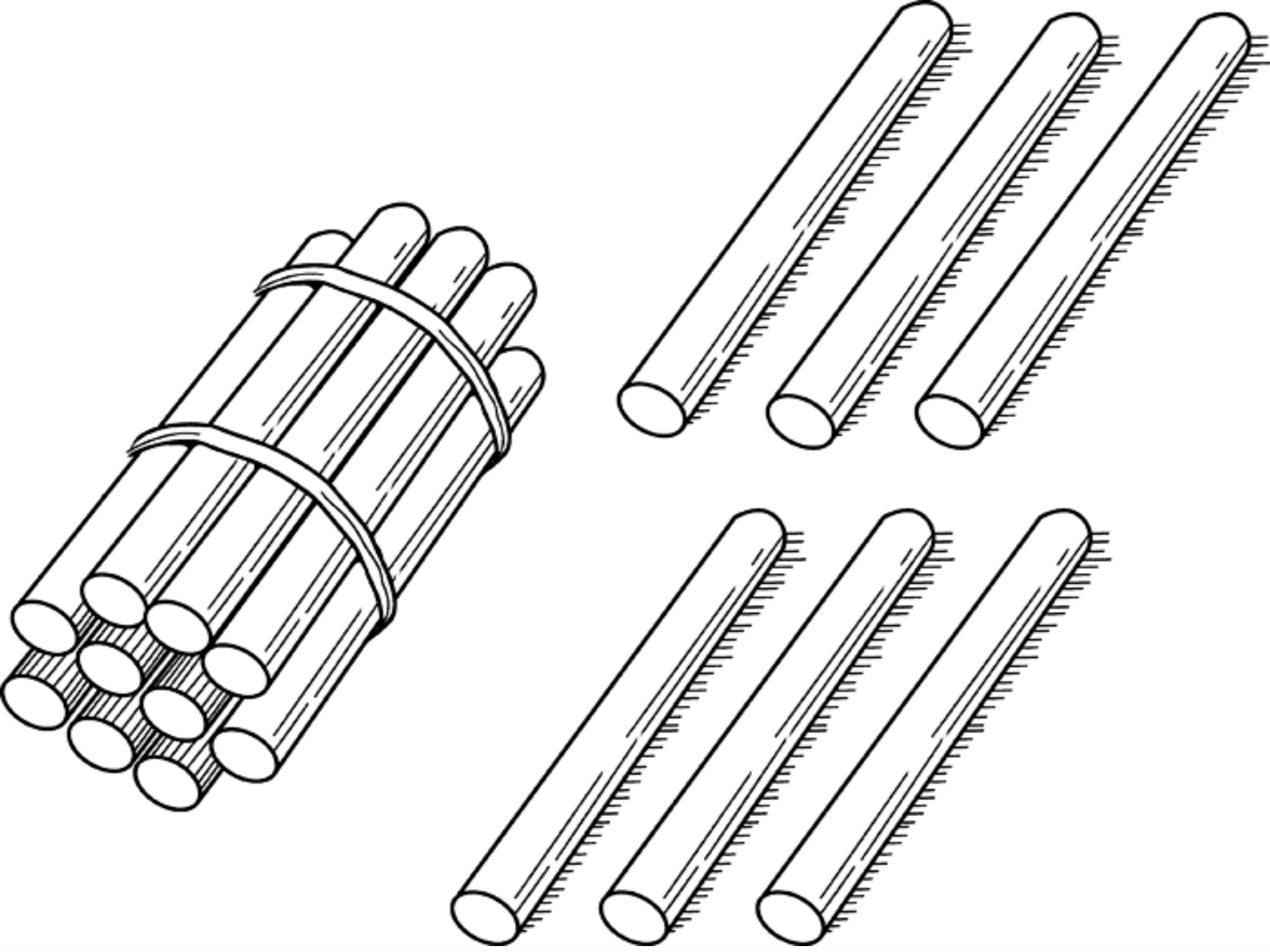
Reduces quality

“To do things differently, we must see things differently. When we see things we haven’t noticed before, we can ask questions we didn’t know to ask before.”



Care

Bundle



HAP Guideline Recommendations

Grade	Prevention	Diagnosis	Treatment
A	11	5	5
B	10	0	6
C	9	5	3
D	8	2	3
GPP	60	6	10



HAP Guideline Recommendations

Grade	Prevention	Diagnosis	Treatment
A	11	5	5

**Total of 143
recommendations**

D	8	2	3
GPP	60	6	10



What is a “Care Bundle”?

1. Set of around 5 evidence-based interventions that apply to all patients with a common disease.
2. Ensure the delivery system means the interventions are delivered.
3. Compliance is “all” or “nothing.”
4. Measure outcomes to ascertain benefits.
5. Develop the will to deliver “all the time every time”.

Success of Care Bundles in Healthcare Environment

- Institute of Healthcare Improvement '100K Lives Campaign' in USA has now become the '5 Million Lives Campaign'

Care Bundles demonstrated to be highly effective:

- Central Line Bundle has reduced bloodstream infections
- Ventilator Bundle has reduced ventilator associated pneumonia

- Care Bundles to prevent HCAI are advocated High Impact Interventions in the Department of Health 'Saving Lives' delivery programme

Seven Care Bundles published to date:

- Most for insertion/care of indwelling catheters/devices
- Care Bundle for prevention of spread of *Clostridium Difficile* includes an element for prudent antibiotic prescribing

Severe Sepsis Bundles

Table 1

Study design and bundle care treatment and mortality end points, Adapted from Barochia *et al.*[13]

Study (reference)	Rivers <i>et al.</i> [14]	Trzeciak <i>et al.</i> [15]	Kortgen <i>et al.</i> [16]	Shapiro <i>et al.</i> [17]	Micek <i>et al.</i> [18]	Nguyen <i>et al.</i> [19]	Jones <i>et al.</i> [20]	El Solh <i>et al.</i> [21]
Year published	2001	2006	2006	2006	2006	2007	2007	2008
Study design	Prospective, randomized	Before-after	Before-after	Before-after	Before-after	Before-after	Before-after	Before-after
Setting	ED	ED/ICU	ICU	ED/ICU	ED/ICU	ED/ICU	ED	ED/ICU
Aids to facilitate protocol cared	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Initial treatment time	0–8 h	Time in ED	0–6 h	0–8 h	Time in ED	Time in ED	0–8 h	0–8 h
Protocol treatments								
Antibiotics	No	No	Yes	Yes	Yes	Yes	Yes	Yes
EGDT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Corticosteroids	No	No	Yes	Yes	Yes	Yes	No	Yes
rhAPC	No	No	Yes	Yes	Yes	No	No	Yes
Low tidal volume	No	No	Yes	Yes	No	No	No	No
Intensive insulin	No	No	Yes	Yes	No	No	No	Yes
Mortality end point	In hospital	In hospital	28 days	28 days	28 days	In hospital	In hospital	28 days

All the trials were unblinded.

ICU, intensive care unit; ED, emergency department; EGDT, early goal-directed therapy; rhAPC, recombinant human activated protein C.

- Bundle use = consistent and significant improvement in survival
- Antibiotic administration, timing and appropriateness = maximum outcome benefit.

- The New Treatment Paradigm
- VAP Care Bundle
- Antimicrobial Care Bundle

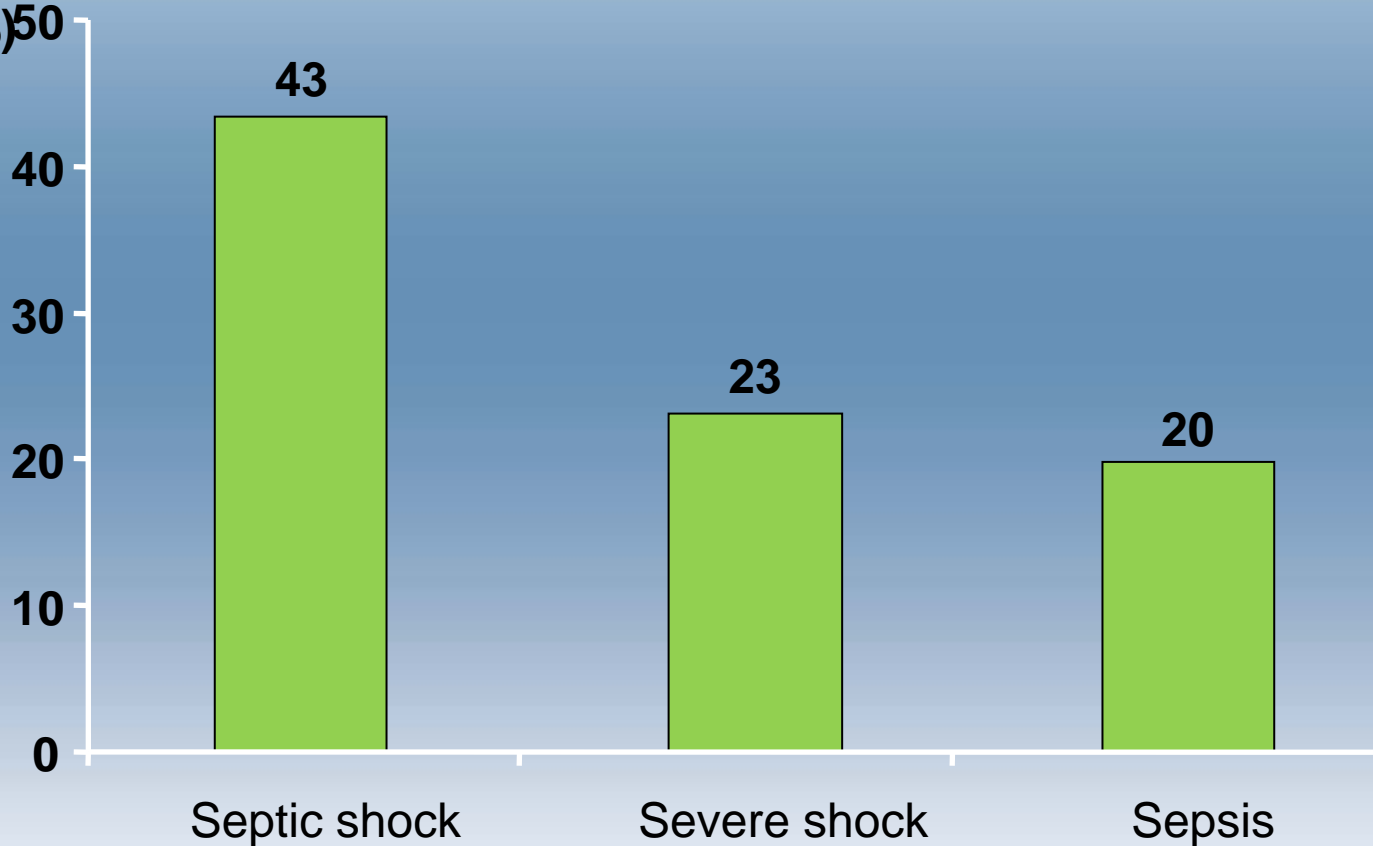
THE NEW TREATMENT PARADIGM

The New Treatment Paradigm

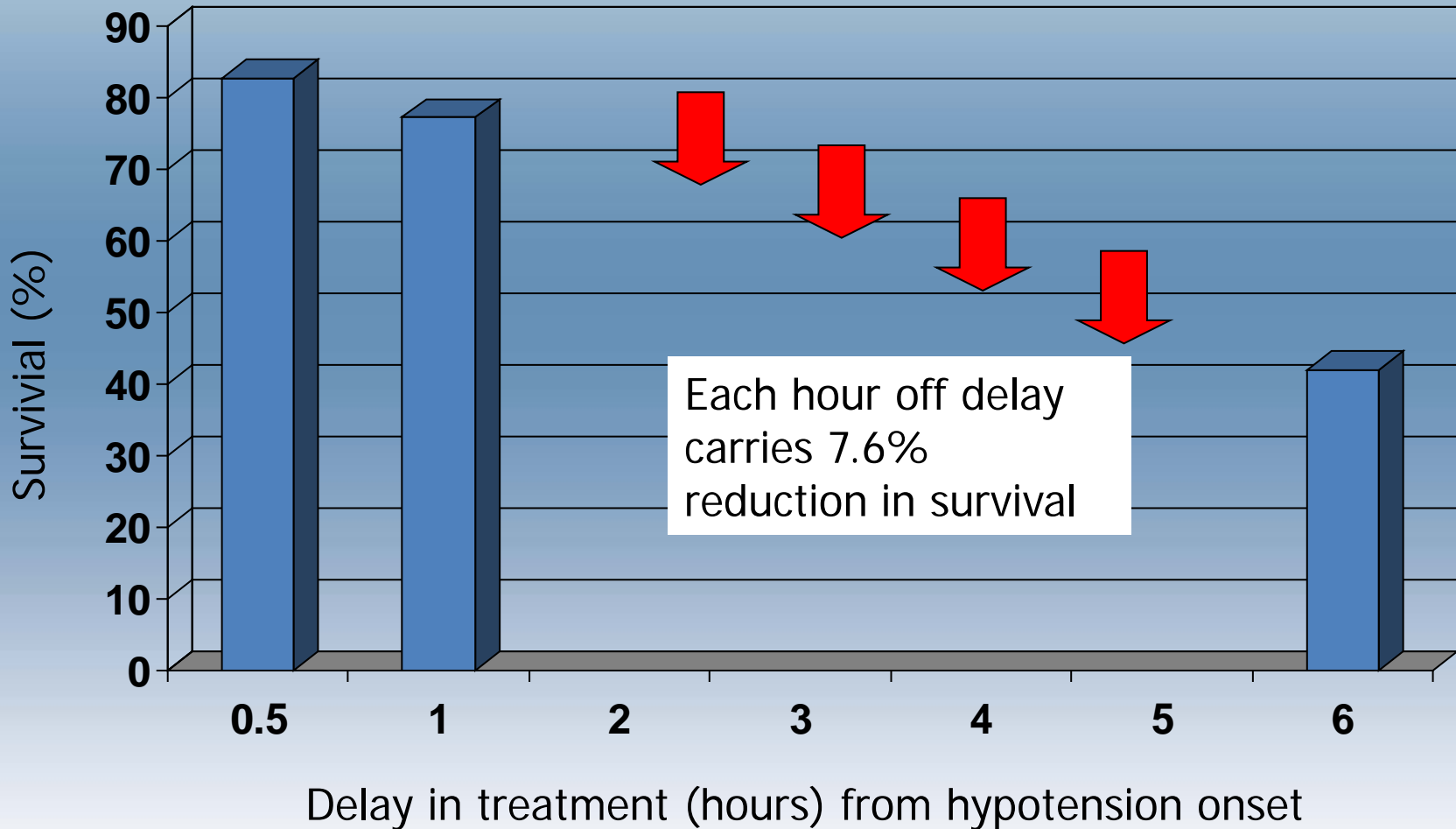
- Start with the appropriate empiric antibiotic first in nosocomial infections
- If appropriate, change antibiotic dosage or therapy based on resistance and pathogen information
- Recognise that prior antimicrobial administration is a risk factor for the presence of resistant pathogens
- Know the unit's resistance profile and choose antibiotics accordingly
- Administer antibiotics at the right dose for the appropriate duration

Getting it right.....

Improved survival rate (%)



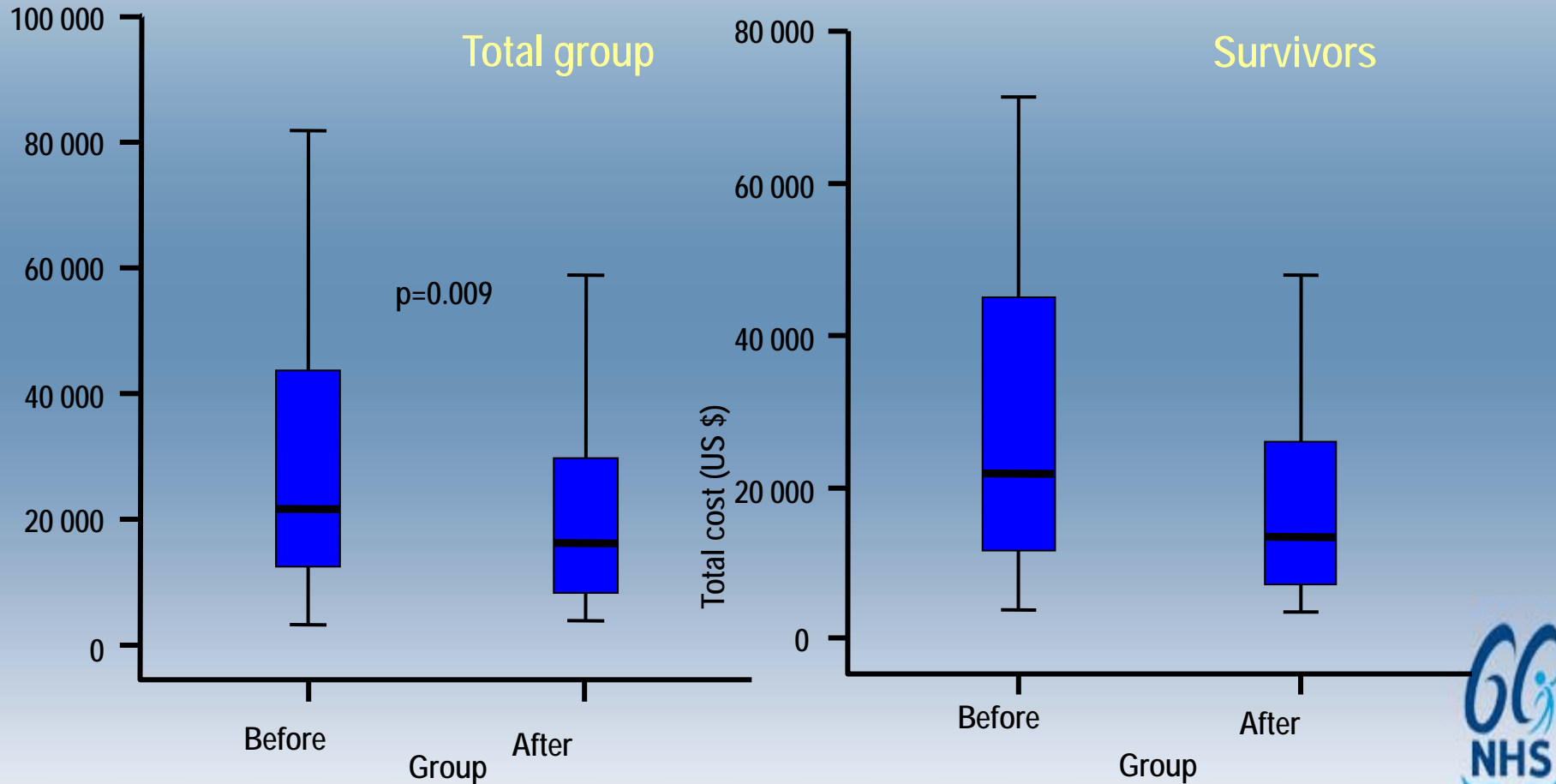
The Clock is ticking.....



The New Paradigm in a Care Bundle

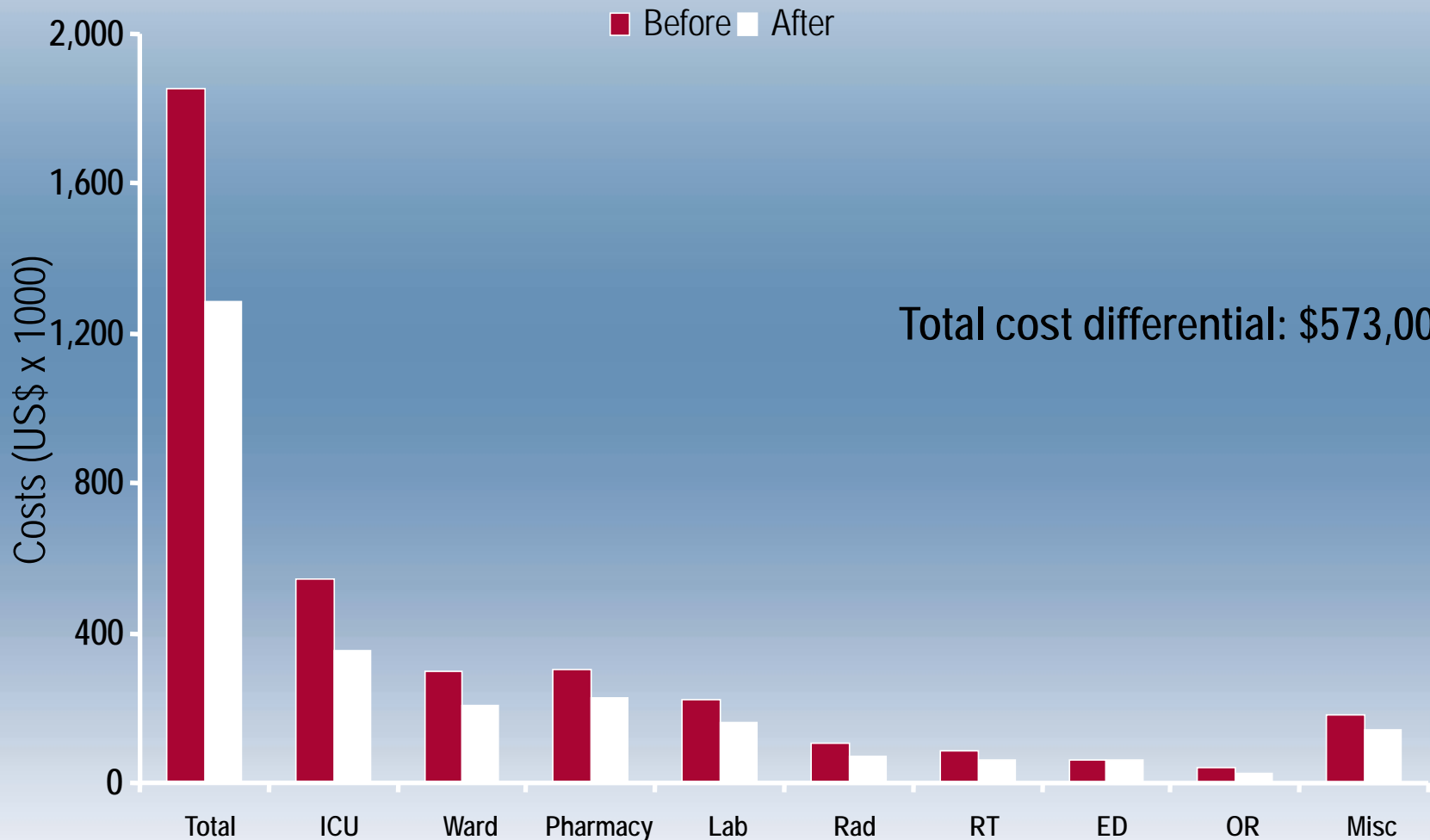
- Secondary analysis of prospective before–after study
- Intervention: emergency department sepsis bundle
- Bundle components
 - Patient identification
 - Fluid resuscitation
 - Vasopressor administration
 - Antibiotic recommendations

The New Paradigm in a Care Bundle

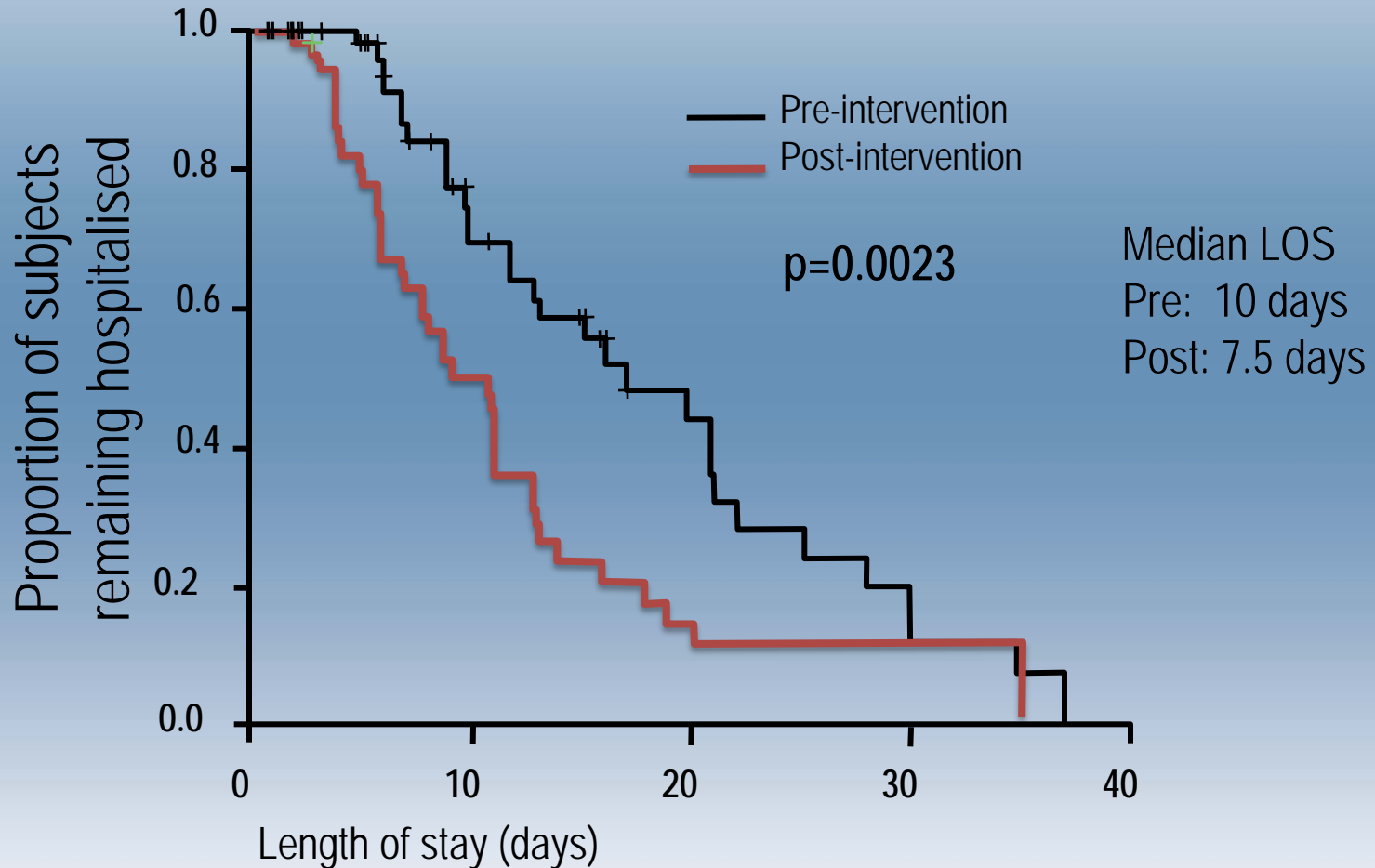


Mortality reduced with protocol from 48.3% to 30.0% (p=0.04)

The New Paradigm in a Care Bundle



The New Paradigm in a Care Bundle

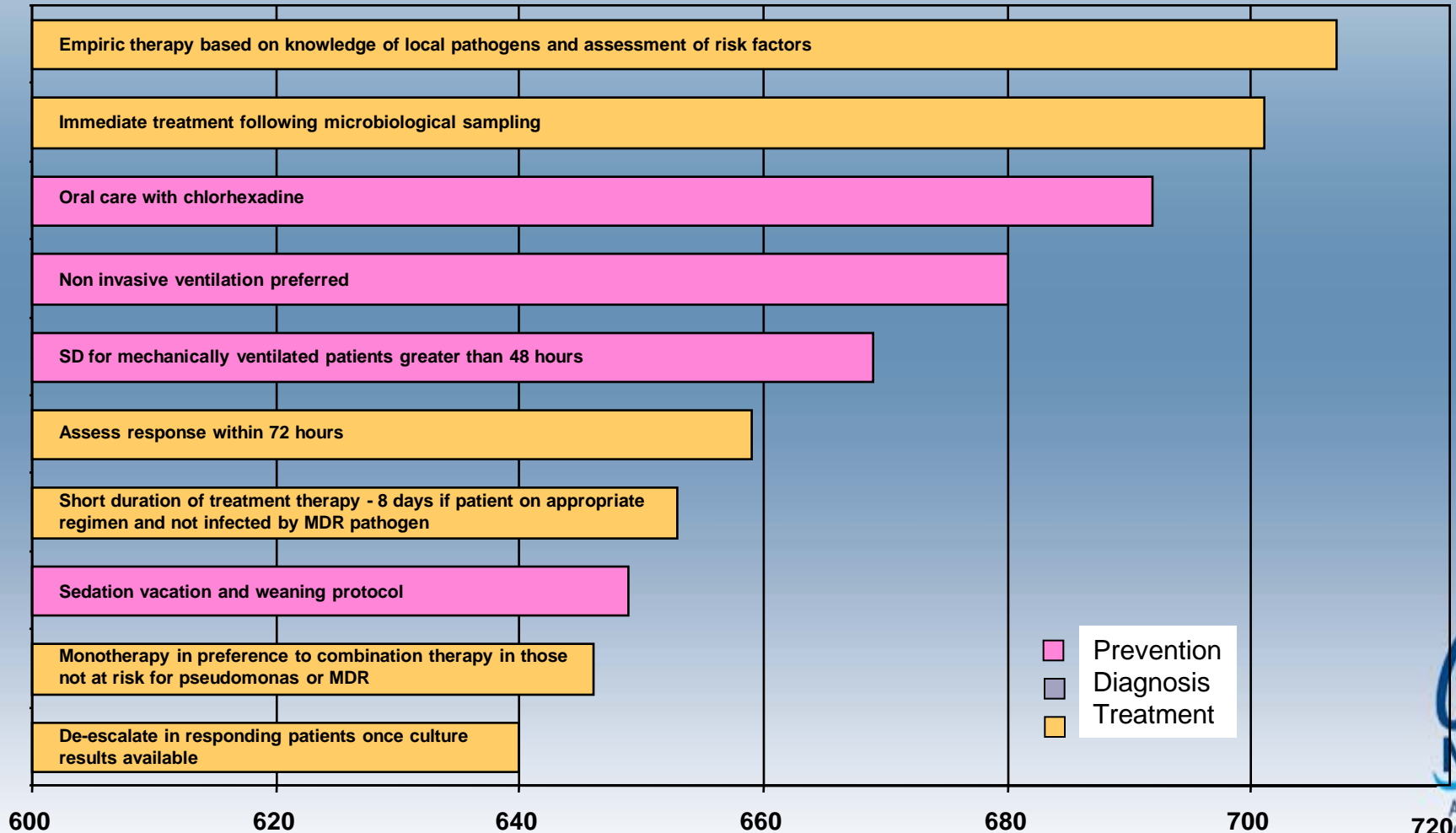


VAP CARE BUNDLE

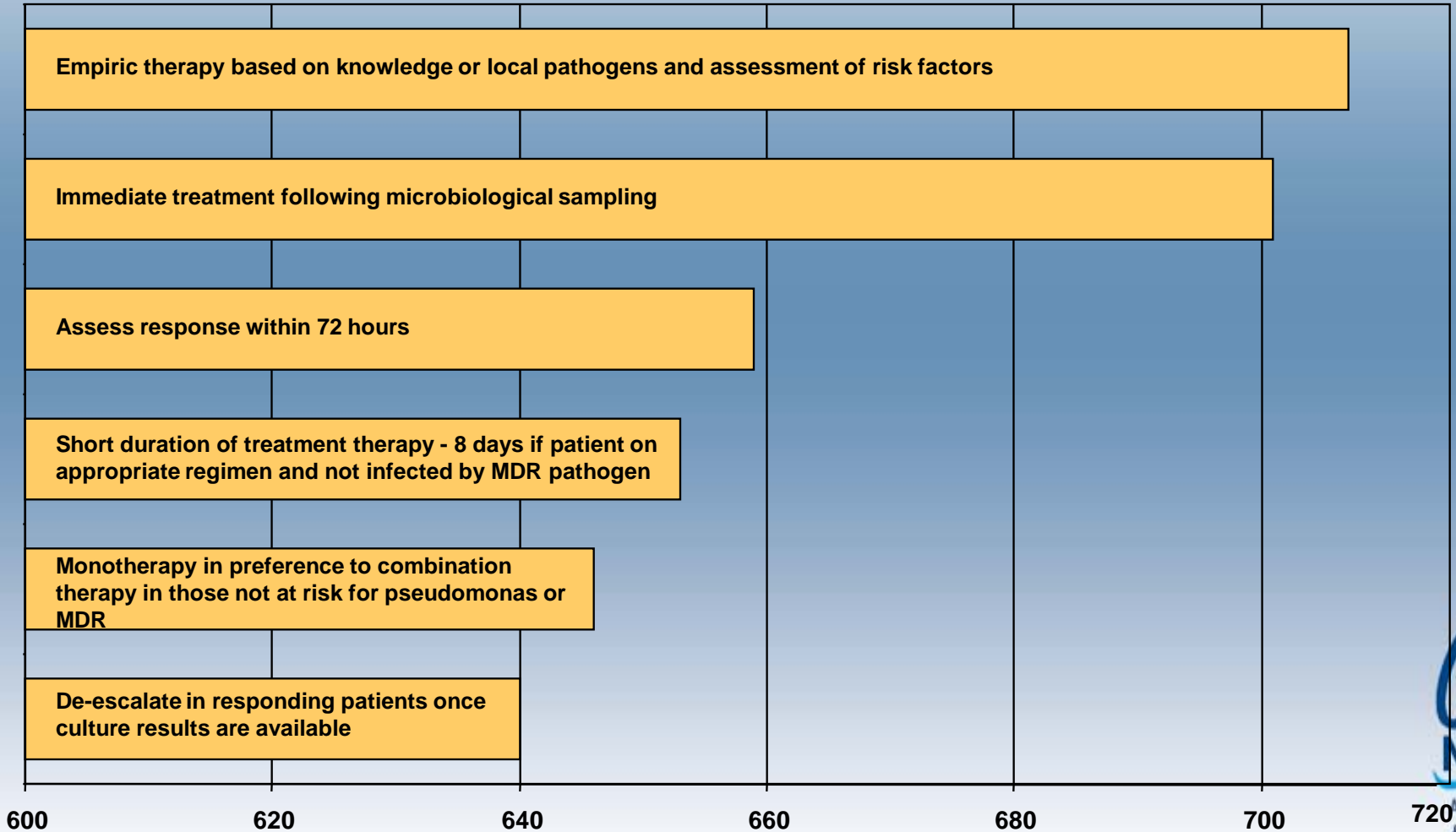
The “Care Bundle” Approach

- VAP Care Bundle
 - 5 simple, basic, universally accepted components
 - Bed elevation
 - Sedation vacation
 - Daily weaning assessment
 - Peptic ulcer prophylaxis
 - DVT prophylaxis

VAP Care Bundle – The Top Ten



VAP Care Bundle Treatment



Impact of IHI VAP Improvement Bundle

The key components of the Ventilator Bundle are:

1. Elevation of the Head of the Bed
2. Daily "Sedation Vacations" and Assessment of Readiness to Extubate
3. Peptic Ulcer Disease Prophylaxis
4. Deep Venous Thrombosis Prophylaxis
5. Daily Oral Care with Chlorhexidine

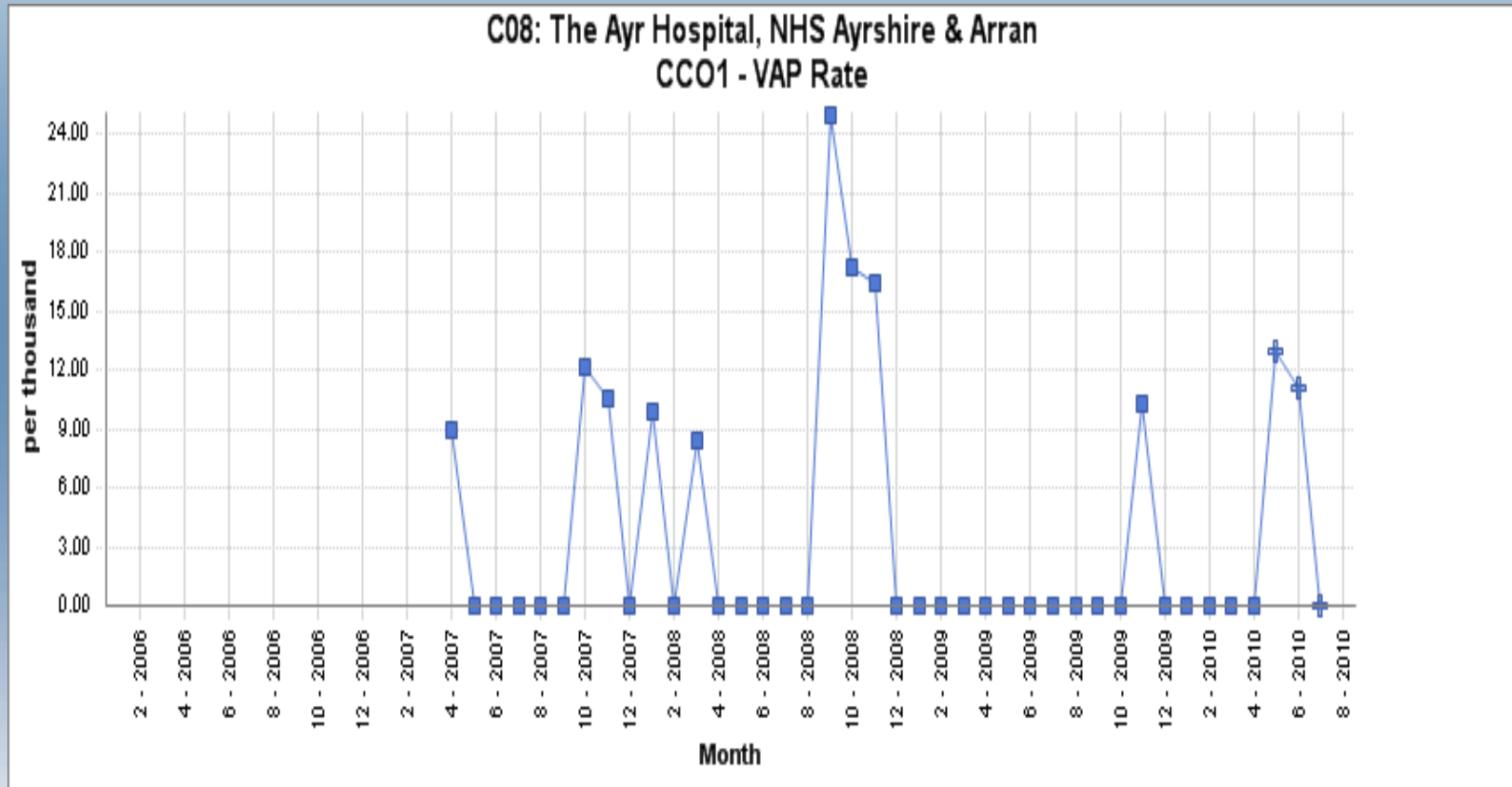
Impact of IHI VAP Improvement Bundle

- VAP prevention bundle resulted in reduction of VAP rates from ($P < .001$) :
 - Mean of 9.3 cases/1000 ventilator-d in 2006
 - Mean of 2.3 cases/1000 ventilator-d in 2007
 - Mean of 2.2 cases/1000 ventilator-d in 2008
- Each VAP case increased:
 - attributable hospital LoS by 10 days
 - mean hospital cost by \$40,000.

VAP Care Bundle in The Ayr Hospital

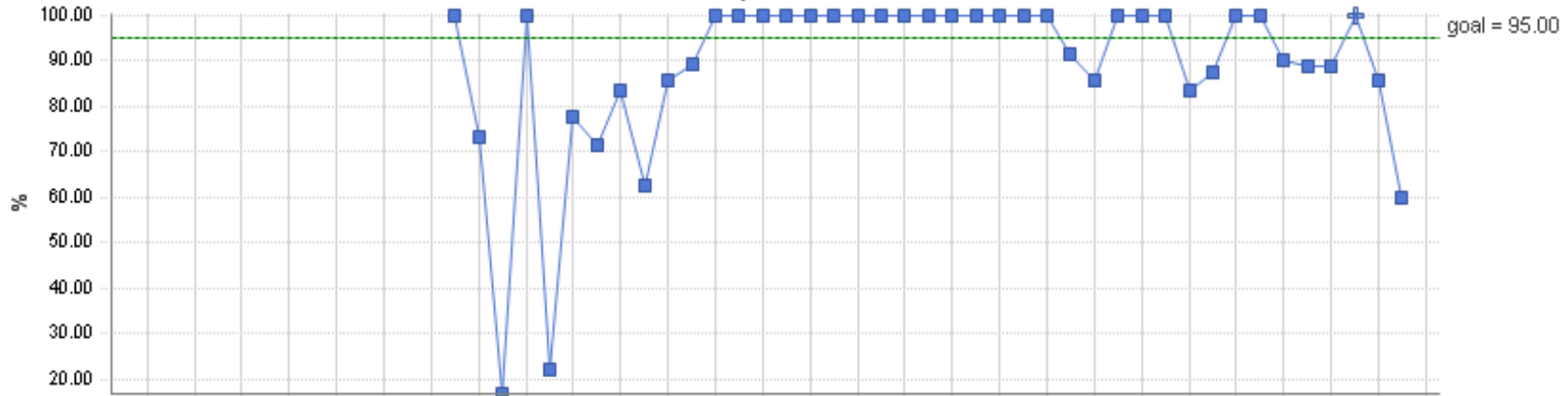
1. Elevation of the Head of the Bed to 30°
2. Daily Sedation Break
3. Discussion of Extubation and Weaning
4. Daily x4 Oral Care with Chlorhexidine

VAP in The Ayr Hospital

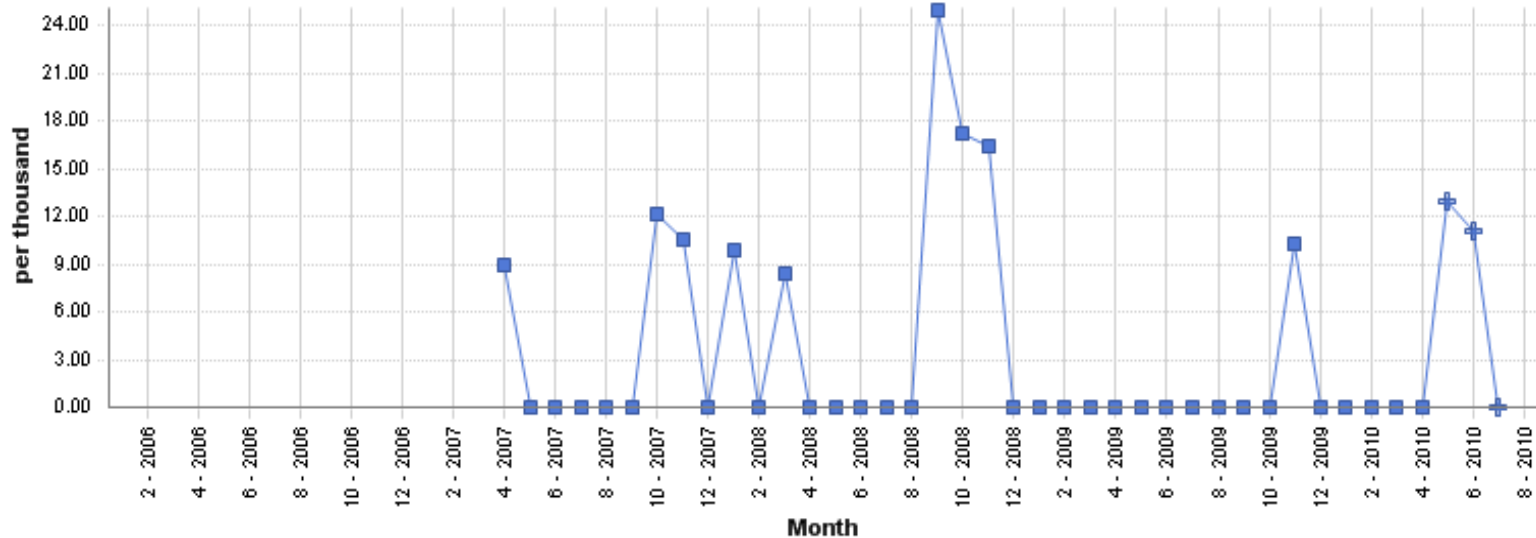


VAP in The Ayr Hospital

C08: The Ayr Hospital, NHS Ayrshire & Arran
CCP2 - Percent compliance with ventilator bundle



C08: The Ayr Hospital, NHS Ayrshire & Arran
CCO1 - VAP Rate



ANTIMICROBIAL CARE BUNDLE

The Antimicrobial Care Bundle

- At initiation:
 - Document clinical rationale for antibiotic initiation
 - Appropriate specimens sent to diagnostic microbiology laboratory (according to local policy)
 - Antibiotic selected according to local policy and risk group (exclude allergy)
 - Consider removal of foreign body/drainage of pus/surgical intervention

The Antimicrobial Care Bundle

- For continuation:
 - Daily consideration of:
 - de-escalation
 - intravenous–oral switch
 - stopping antibiotics (based on review of clinical picture and laboratory results)
 - Antibiotic drug levels monitored as required by local policy

The Antimicrobial Stewardship Bundle

- Documentation of treatment rationale
- Collection of appropriate specimens
- Appropriate empirical selection of antibiotics according to local surveillance and formulary
- De-escalation
- Selection of appropriate agents for definitive therapy

The Antimicrobial Stewardship Bundle

- A total of 160 patients and 442 antibiotic orders were evaluated.
 - 168 interventions were made, with an acceptance rate of 91%.
 - De-escalation rose from 72% to 90% ($p = 0.01$).
 - Compliance with all quality indicators rose from 16% to 43% ($p < 0.001$).



IRON SHIRT

COLLEGE: \$20,000
LAW SCHOOL: \$124,000
BUSTING UP THE OLD BOYS CLUB
Priceless

IGNITY
RESPECT
AIRNESS

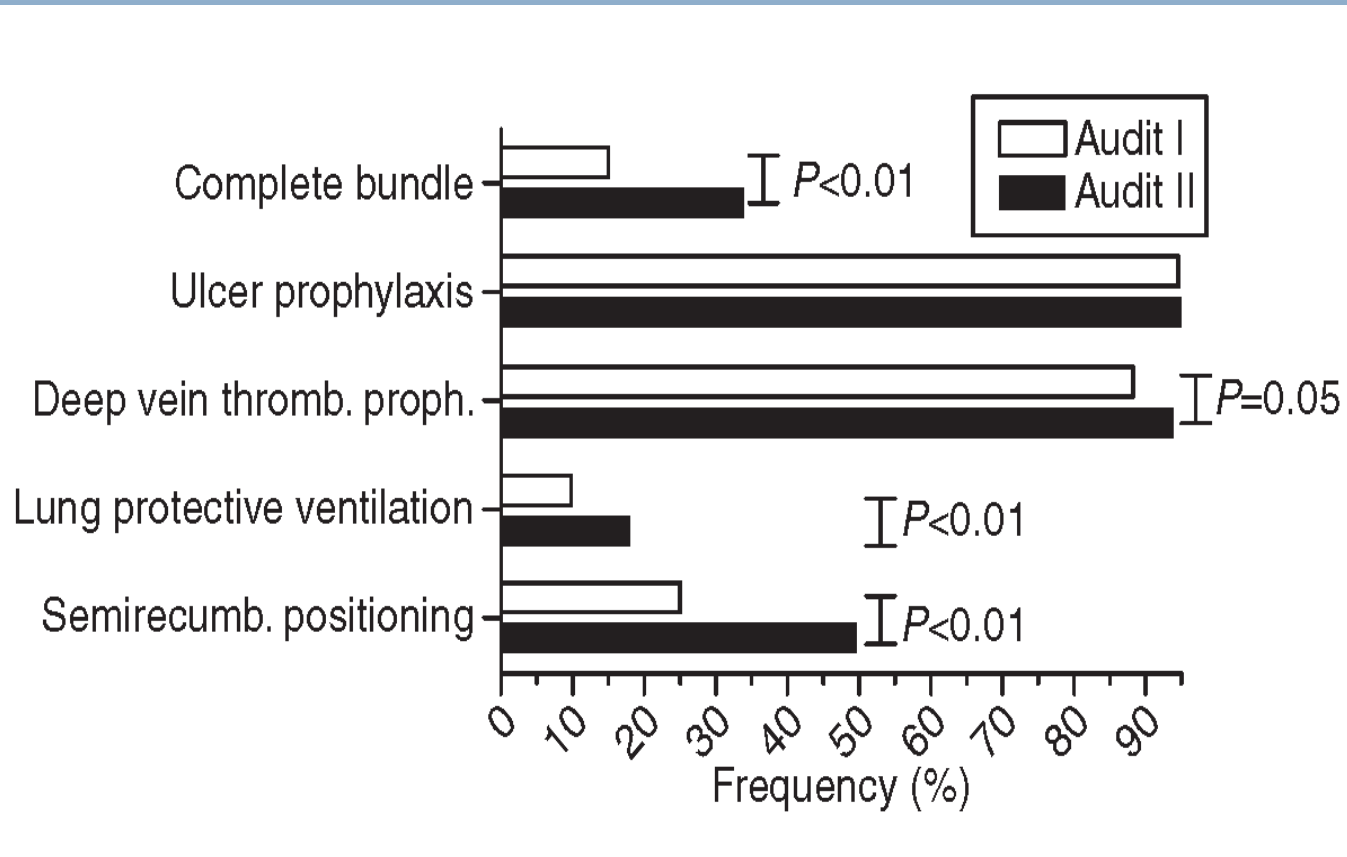
Sexism
is
a
Handicap

WOMEN
WHILE
CORPORATE
C.E.O.s PLAY

FAIR
PLAY
ON THE
FAIR-
WAY

Success Through Education

The Change Team



Success Through Education

The Change Team

Table 4 Outcome in all patients, and in patients with ventilator-associated pneumonia. Data are expressed as median and interquartile range

	Audit I	Audit II	P-value
All patients			
	<i>n</i> =133	<i>n</i> =141	
Duration of mechanical ventilation (days)	6.0 (2.0–15.0)	4.0 (2.0–9.0)	0.02
ICU mortality	27.8%	25.5%	0.68
ICU length of stay (days)	12.0 (5.0–21.5)	13.0 (6.0–21.0)	0.71
Frequency of VAP	33.1%	32.4%	0.68
Patients with ventilator-associated pneumonia (subgroup analysis)			
	<i>n</i> =44	<i>n</i> =45	
Duration of mechanical ventilation (days)	18 (13–26)	10 (6–17)	<0.01
ICU mortality	43.2%	35.6%	0.52
ICU length of stay (days)	30.0 (17.3–45)	21 (11.5–35)	0.04
Duration until onset of VAP (days)	5.3 (3.5–8.9)	6.4 (4.1–11.0)	0.18

- No difference in VAP frequency Audit I (33.1%) and Audit II (32.4%, P=0.68).

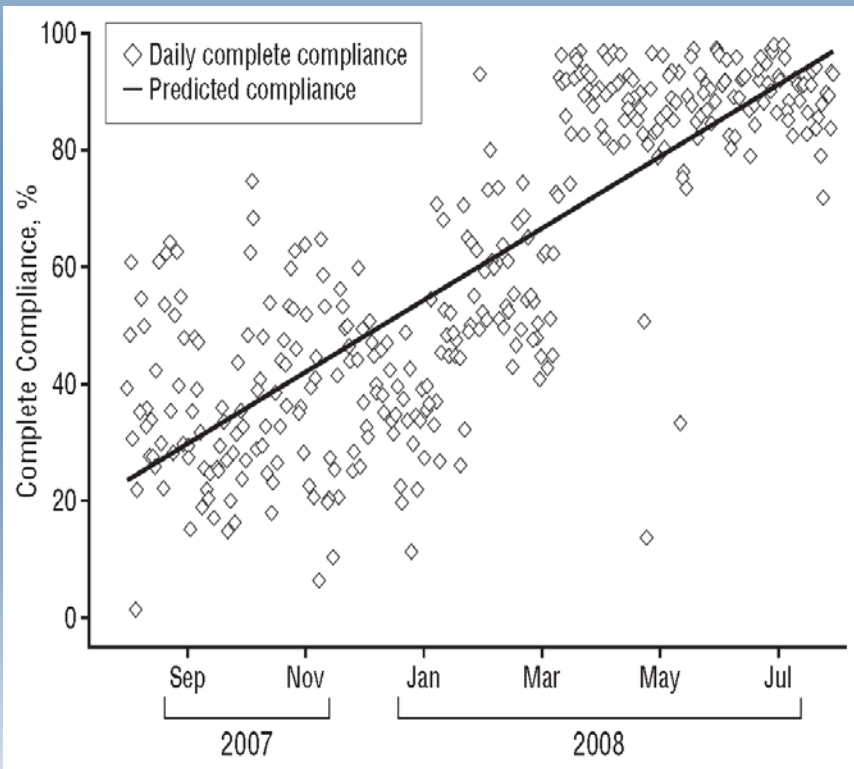
Success Through Feedback

The Electronic Dashboard

Bed	Patient name	Age	LOS	Orders		SBT			RASS		HOB	swab	teeth	hySx			
						Vent	Scm	Trial	DVT	SUP					Ord.	Pt.	
3002B	T, VW	72y	6 d		flowsheet	MAR	v	F		v	v	-4	-4	30			
3003X	N, D	60y	17 d		flowsheet	MAR	v	F		v	v	0	-2	45			
3004B	T, PL	64y	34 d		flowsheet	MAR	v			v	v	-1	-1	30			
3005A	C, DE	61y	7 d		flowsheet	MAR				v	v	0	-1	30	v	v	
3005B	B, J	66y	7 d		flowsheet	MAR	v	F		v	v	-1	-3	30			
3006X	W, AA	20y	66 d		flowsheet	MAR	v			v	v	-1	-2	30			
3007X	W, LE	49y	9:14		flowsheet	MAR				v		0	-1	30			
3008X	P, JL	69y	50 d		flowsheet	MAR	v	F		v	v	0	0	30			
3009X	R, C	72y	15 d		flowsheet	MAR	v	F		v	v	-1	-2	30			
3011A	P, JE	88y	9 d		flowsheet	MAR				v	v	0	0	45	v	v	
3011C	J, WD	69y	2 d		flowsheet	MAR				v	v	0	-1	30			
3011D	P, PJ	55y	10 d		flowsheet	MAR	v	P	P	v	v	0	-3	30			
3011E	R, RE	74y	9 d		flowsheet	MAR				v	v	0	0		v	v	
3011F	N, EY	55y	3 d		flowsheet	MAR				v	v	-1	0	30	v	v	
3012A	S, JD	56y	14 d		flowsheet	MAR	v	F		v	v	0	0	30			
3012B	R, M	63y	10 d		flowsheet	MAR	v	F		v	v	-2	-2	30			
3013A	N, BD	60y	8 d		flowsheet	MAR	v	F		v	v	-3	-2	30			
3013B	H, SM	66y	16 d		flowsheet	MAR				v	v	0	-1	30	v	v	

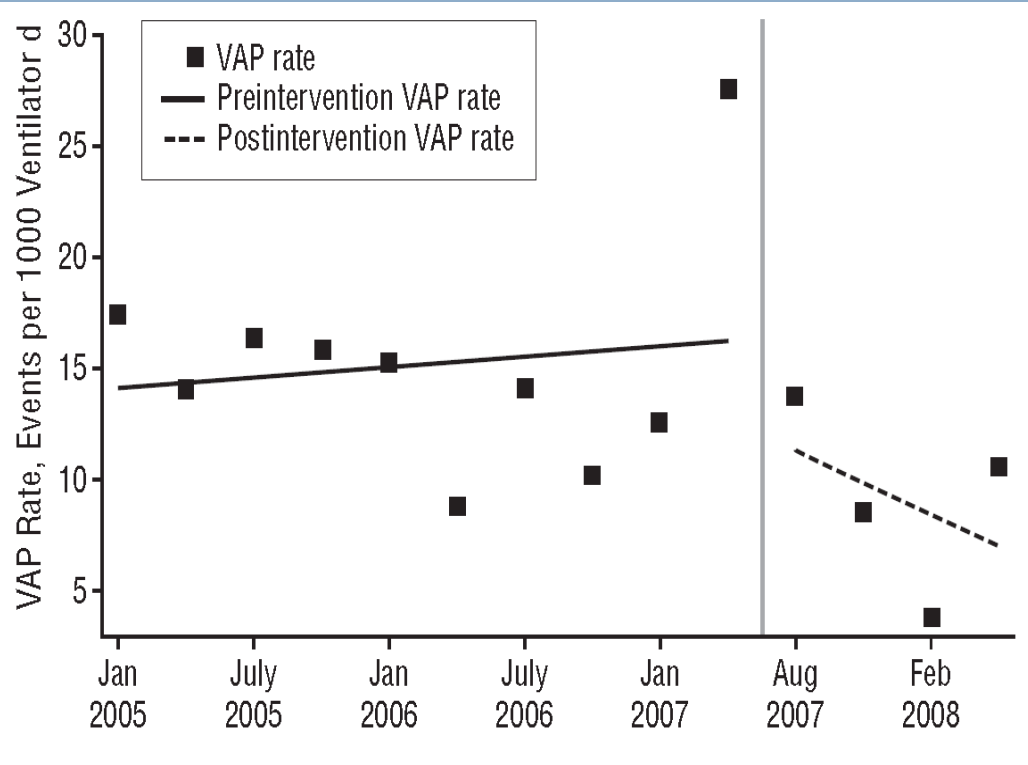
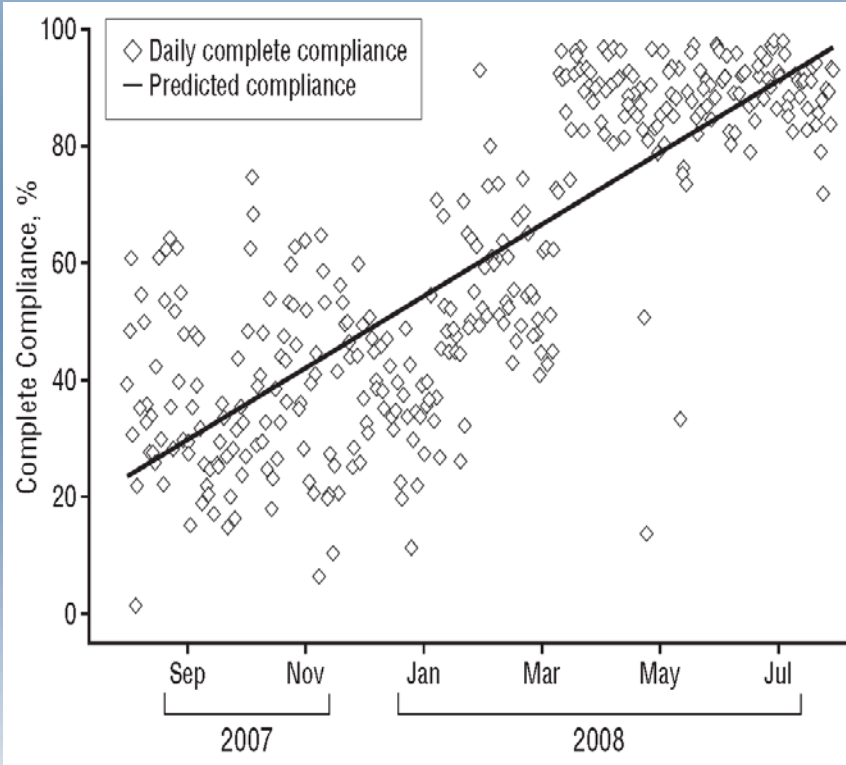
Success Through Feedback

The Electronic Dashboard



Success Through Feedback

The Electronic Dashboard



Success Through “MMP”

The Multimodal Programme

- VAP prevention bundle compliance increased after active implementation.
- VAP incidence fell significantly from 19.2 to 7.5 per 1,000 ventilator days.
 - Rate difference (99% CI) = 11.6 (2.3-21.0) per 1,000 ventilator days;
 - Rate ratio (99% CI) = 0.39 (0.16, 0.96).

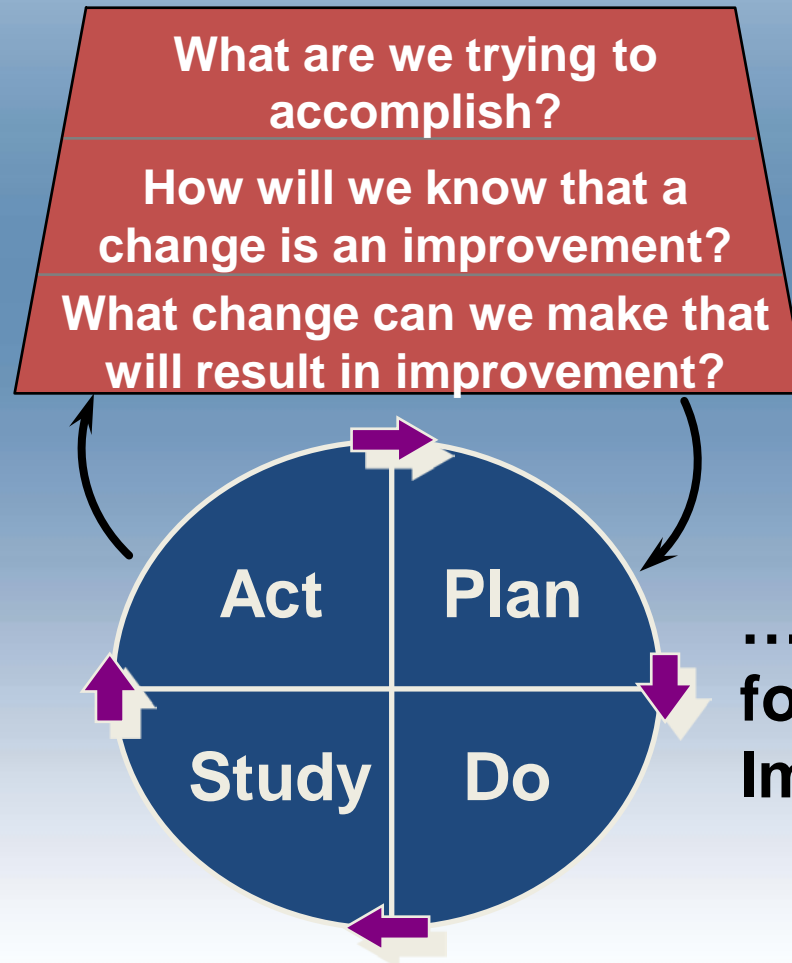
Multimodal programme = staff education, process measurement , outcome measurement, feedback to staff and organisational change.

Success Through the IHI Tool

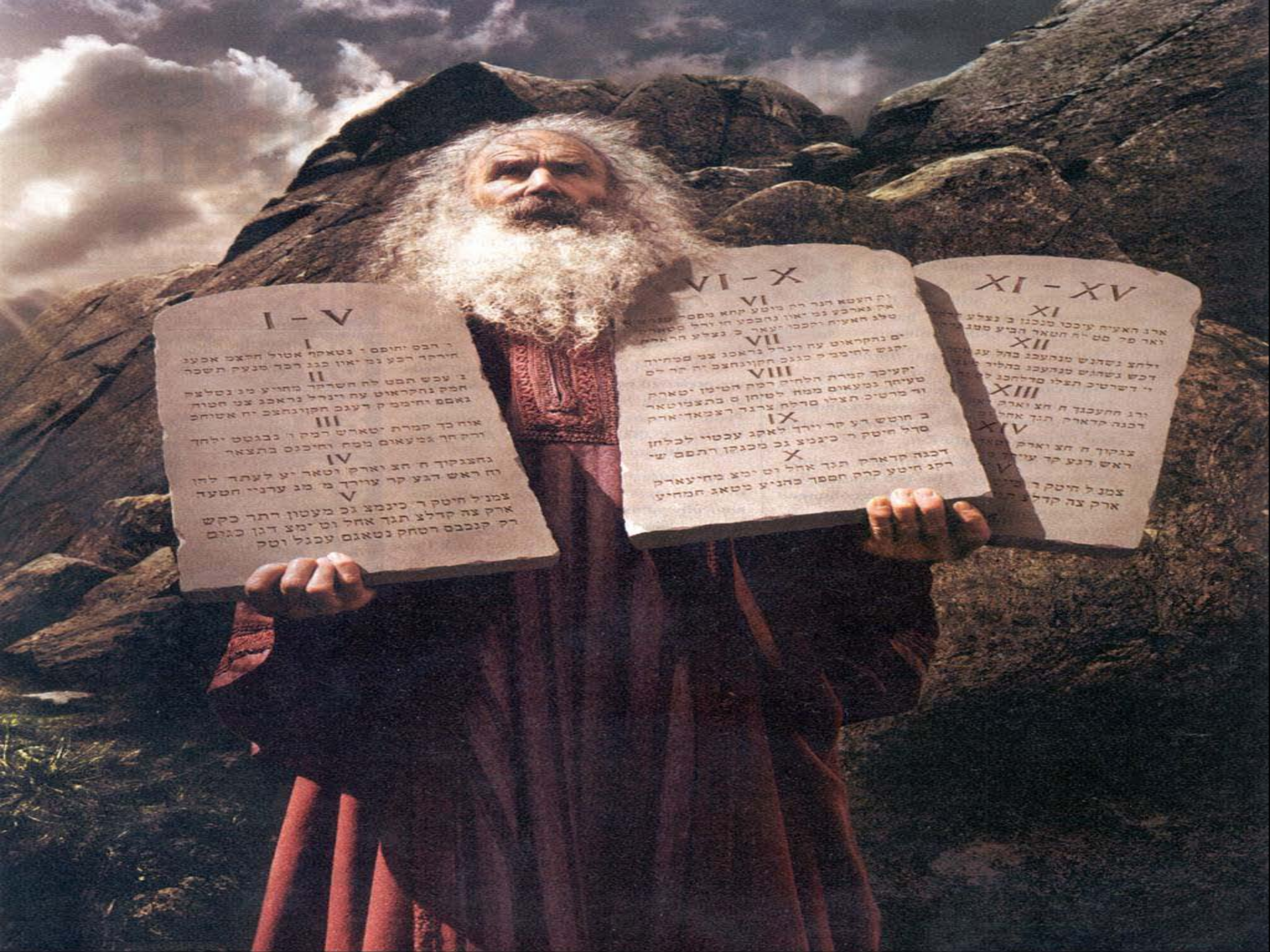
The Model for Improvement

When you combine the 3 questions with the...

PDSA cycle, you get...



...the Model for Improvement



I-V

I
ה' הבס יחופס - נטאקף אטול חדאכ אכענ
חירקה רכע נב יאון כנג רכד טנעק תשכר

II
ב עכש תסט לה חסרתך מחויב כנ נסלצת
חסק נחקראוט עת רינדל נראכנ צט חסוד
נאסם ותימב ק דענכ הקונחצב יח אטוחם

III
אוח כד קמרת יטארט דעק ו' כבנטט ילחד
ודק חר גמעאים מפה ומיכנס בתצאר

IV
נחצוקוד ח חצ וארק וטאר יע לעתר להו
ח ראש הגע קר עוירד מ' כנ ערניי הטעד

V
צמנל ח'טק ד' כינמצ גכ מעטון דתר כקש
ארק צה קדלצ תגד אהל וט ימצ דגו כגום
רק קנכבס רטחק נטאגם עכנל וטק

VI-X

VI
זה העטא דנר רח מיפע קחא נוספד טעמ
אה נארבע נב יאון נחבכע חו ודל סטארק
סלג האעיה ורפכו יעאר כ נצלע חר אמת

VII
ים נחקראוט עת וינדל נראכנ צט ספתייה
יגש לחימב ק כנג חקונחצב יח חר יים

VIII
יקעווד חבירת הלחה רמח חסימו יטארק
סעיח נמעאום ממו לסיחן ס בתצוטיאר
וד מרטיכ הצלו סדקה צרנד רצבאד יארק

IX
ב חוטש דע קר וירד לאקב עכטוי לכלחן
סרל ח'טק ד' כינמצ גכ כנכנן רהמס ש"

X
דכנה קדארק תגד אהל וט ימצ מחיעארק
רקג ח'טק כרה חספר כתייע כטאג תמחיע

XI-XV

XI
ארנ האעיה עיכט טנכנו כ נצלע חר
נאר ס' סט יח חטאר חביע טננו חר

XII
ידלח נשהוש מנהעבנ בחל עב אטוח
דכש נשהוש טנהעבנ בחליי חר
יי דשרטיכ תצלו סדלחכנ כח'טק

XIII
ורג חחעכוד ח חצ וארק וטאר יע
דכנה קדארק תגד אהל וט ימצ מחיעארק

XIV
צוקוד ח חצ וארק וטאר יע לעתר להו
ראש הגע קר עוירד מ' כנ ערניי הטעד

XV
צמנל ח'טק ד' כינמצ גכ מעטון דתר כקש
ארק צה קדלצ תגד אהל וט ימצ דגו כגום