



# THE ECONOMICS OF PATIENT SAFETY

## STRENGTHENING A VALUE-BASED APPROACH TO REDUCING PATIENT HARM AT NATIONAL LEVEL

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# A health system perspective on patient safety

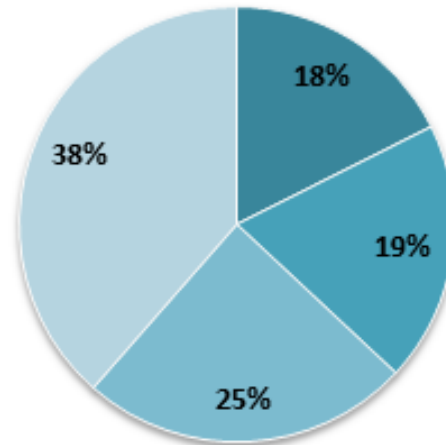
- The burden and cost of patient harm and balancing prevention and failure costs (based on literature reviews)
- Impact and costs of patient safety interventions; rating and choosing the best buys (based on literature and a survey amongst a panel of 8 expert and policy makers from 15 countries)



Patient harm is the 14th leading cause of the global disease burden. This can be compared to tuberculosis and malaria. The majority of this burden falls on the developing countries.

**Figure 1. Low income countries carry the heaviest burden of mortality and morbidity caused by adverse events (2015)**

■ High income   ■ Upper middle income   ■ Lower middle income   ■ Low income



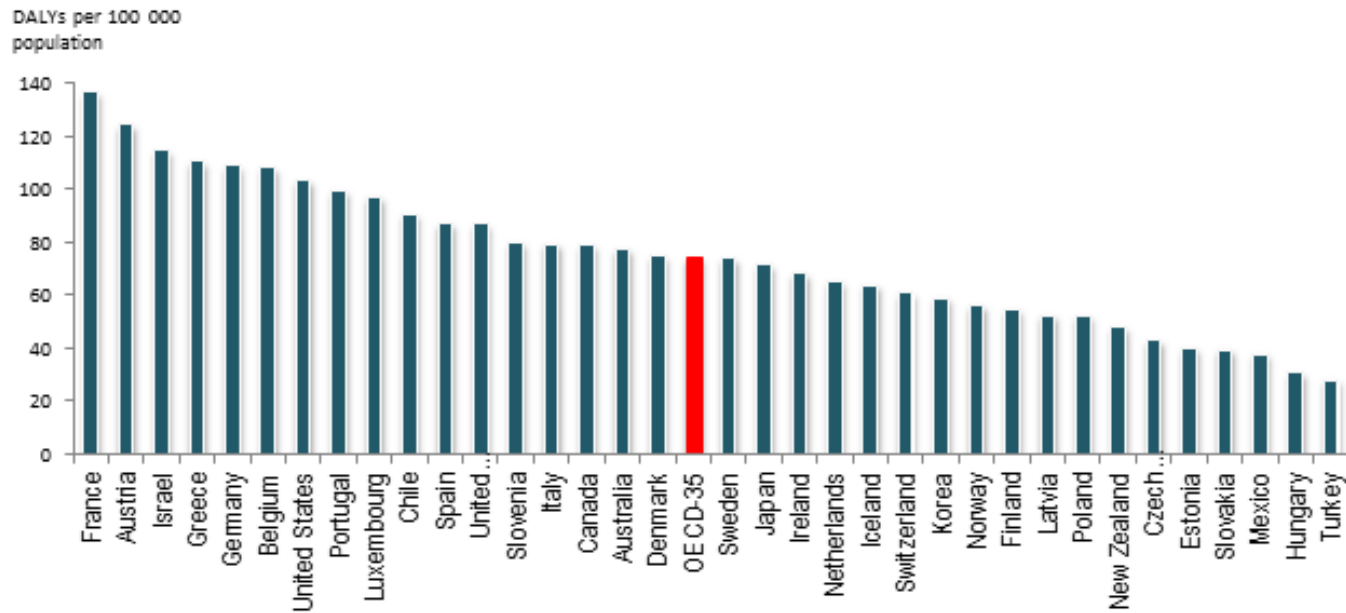
Note: Percentage of average DALYs/country. Classification of countries based on the World Bank categories.

Source: IHME 2015



# DALY's attributable to patient harm in OECD countries

Figure 2. DALYs attributable to patient harm in OECD countries (2015)



Source: IHME 2015



Most research on the cost of patient harm has focused on the acute care setting in the developed world where the disease burden can be compared to chronic conditions such as multiple sclerosis and some types of cancer.

**Table 3. Disease burden of 6 adverse event types compared to chronic conditions in England**

Disease	Annual burden per 100,000 pop/n	Total annual burden across England
All adverse events*	86 DALYs	46,491 DALYs
Multiple sclerosis	80 DALYs	42,400 DALYs
6 adverse event types	68 DALYs	36,000 DALYs
HIV/AIDS and Tuberculosis	63 DALYs	33,400 DALYs
Cervical cancer	58 DALYs	30,740 DALYs
Interpersonal violence	57 DALYs	30,200 DALYs

Source: Hauck et al (2017), \*IHME (2015)

**Table 5. Annual impact of 6 adverse events in a typical English Hospital**

	Bed days lost	Cost of bed days lost	Admissions foregone	Salaried GPs	Hospital nurses
Across England	495,020	GBP151 million	69,721	2,218	3,574
Avg English Hospital	2,024	GBP 617,000	285	9	15

Source: Hauck et al (2017); OECD.stat

sepsis; pressure ulcers; inpatient hip fractures due to falls; VTE; central line infections; deaths in low-mortality conditions



The financial impact of safety failure is considerable. Approximately 15% of total hospital activity and expenditure is a direct result of adverse events. The most burdensome adverse event types include venous thromboembolism, pressure ulcers, and infections

**Table 6. Economic burden due to adverse events in acute care or hospital care (as share of public hospital spending)**

Adverse events in hospitals			Share of public hospital spending
Brown, P. (2002)	New Zealand	The results suggest that treating adverse events costs hospitals over \$870 million.	32%
Rafter et al., (2016)	Ireland	Adverse events relate to adult inpatient amounted to 194 million€ in 2009	4%
Etchells et al (2012)	Canada	Financial burden of adverse events in Canada in 2009–2010 was \$CAN 1,071,983,610	4.2%
Jackson (2009)	Canada	Administrative data.	14%
Health Policy Analysis, Australia (2013)	Australia	Hospital-associated conditions modelled to range between AUD 634 million and AUD 896 million	12 % – 16.5%
Ehsani etl al (2006)	Australia (Victoria)	Impact of adverse events modelled from hospital administrative data was AUD 6,800 per episode or AUD 460 Million in aggregate.	15.7%
Zsifkovits et al (2016)	Europe	Direct costs for the public care sector ranged from 2.8 billion euros to 84.6 billion euros	0.2%-6% *
Hoonhout L. et al (2009)	Netherlands	Costs estimated at a total of €355 million for all adverse events in hospitals	1.8%
Adverse events in long term care			
Levinson, D.( 2014)	United States	Long-term care 2% of all Medicare spending is associated with treatment of adverse events.	2%



## Related costs outside the hospital

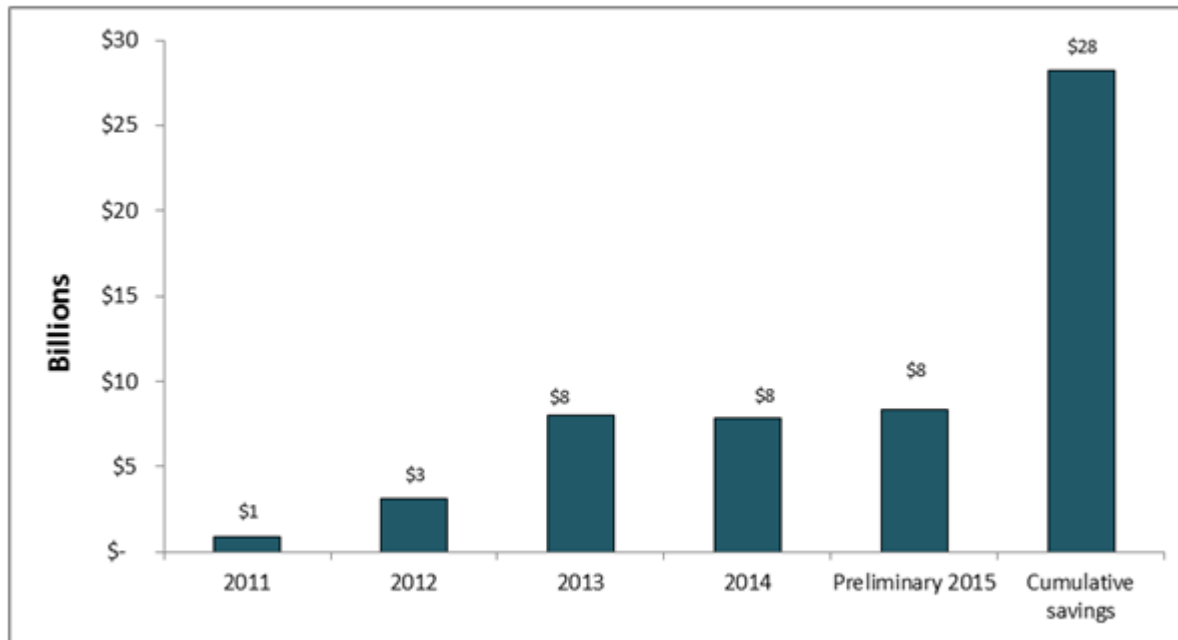
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- Less is known about harm in primary and ambulatory care. Research indicates that wrong or delayed diagnosis is a considerable problem. Some studies suggest that every adult in the United States can expect to be harmed as a result of diagnostic error at some point in their lifetime.
- The flow-on and indirect costs of harm include loss of productivity and diminished trust in the healthcare system. In 2008, the economic cost of medical error in the US was estimated to be almost USD 1 trillion.



Many adverse events are preventable. For example improving patient safety in US Medicare hospitals is estimated to have saved USD 28 Billion between 2010 and 2015.

**Figure 7. Total Annual and Cumulative Cost Savings (2010 Baseline) in USD Billions**



Source; AHRQ 2016

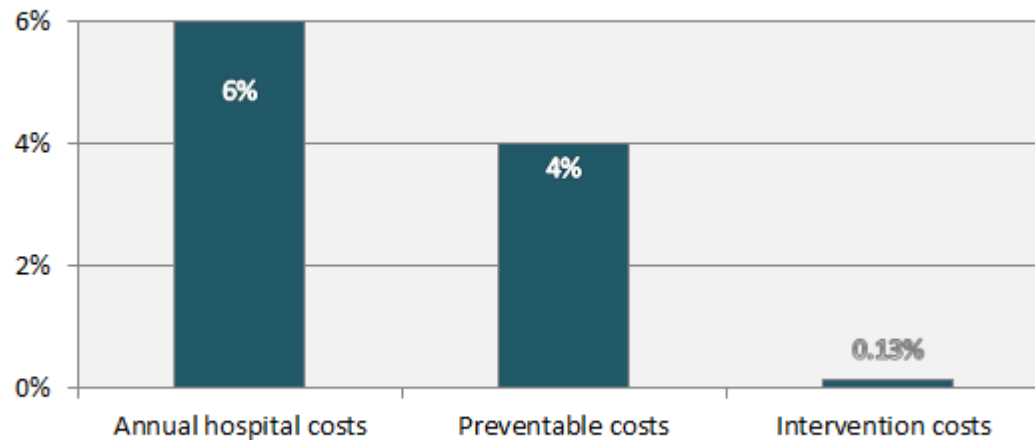




# Furthermore the costs of prevention are dwarfed by the cost of failure.

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**Figure 6. Annual hospital costs of venous thromboembolism dwarf the costs of prevention**

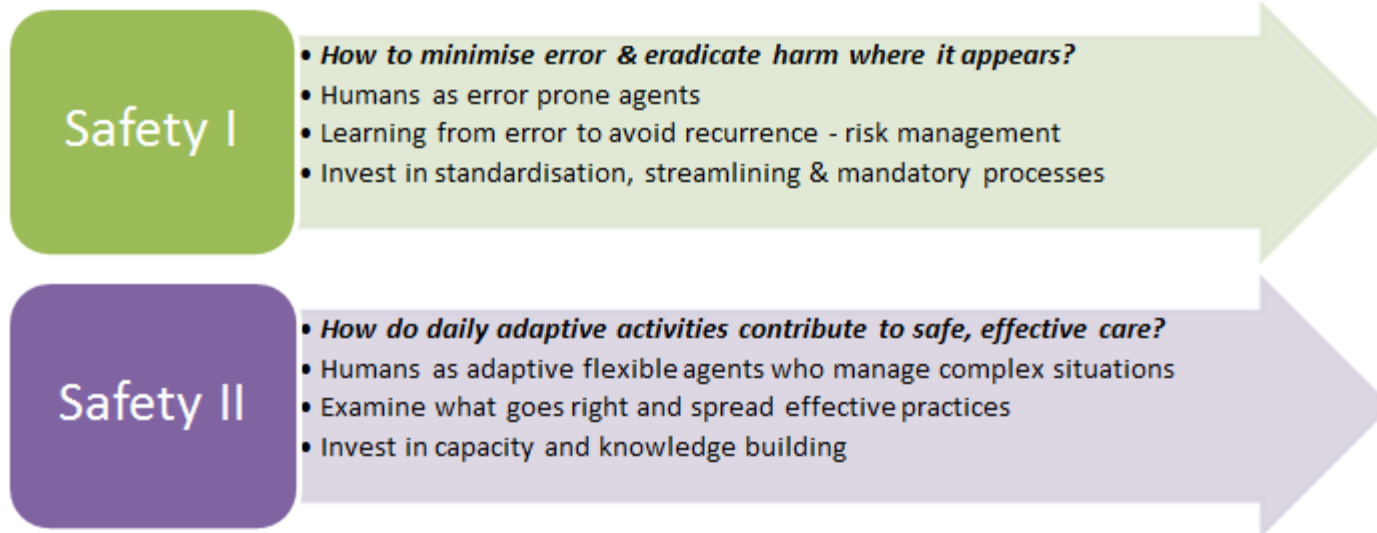


Source: Mahan et al, 2011



# Strategies to turn health care into a high reliability industry

Figure 9. 'Safety I' and 'Safety II' are complementary



Source: Authors' adaption of Braithwaite & Donaldson (2016) and Braithwaite et al (2015)



# Patient safety interventions included in the snapshot survey (scoring of perceived impact and costs by 8 experts and policy makers in 15 countries)

1. System level interventions	2. Organisational (institutional) level interventions	3. Clinical-level interventions
1.1 Safety Standards linked to accreditation and certification	2.1 Clinical governance systems and frameworks related to safety	3.1 Medication management / reconciliation
1.2 Public reporting of patient safety indicators	2.2 Clinical incident reporting and management system	3.2 Transcribing error minimisation protocols
1.3 Mandatory reporting of specified adverse events	2.3 Integrated patient complaints reporting system	3.3 Smart infusion pumps and drug administration systems
1.4 Pay-for performance schemes for patient safety	2.4 Monitoring and feedback of patient safety indicators	3.4 Aseptic technique protocols and barrier precautions
1.5 Professional education and training	2.5 Person- and patient-engagement initiatives	3.5 Urinary catheter use and insertion protocols
1.6 Electronic Health Record (EHR) systems	2.6 Clinical communication protocols and training	3.6 Central line catheter insertion protocols
1.7 No-fault medical negligence legislation	2.7 Digital technology solutions for safety	3.7 Ventilator-associated pneumonia minimisation protocols
1.8 System-level public engagement and health literacy initiatives	2.8 Human resources interventions	3.8 Procedural / surgical checklists
1.9 National interventions based on specific safety themes	2.9 Building a positive safety culture	3.9 Operating room integration and display checklists
1.10 A national agency responsible for patient safety	2.10 Infection detection, reporting and surveillance systems	3.10 Peri-operative medication protocols
	2.11 Hand hygiene initiatives	3.11 VTE prevention protocols
	2.12 Antimicrobial stewardship	3.12 Clinical care standards
	2.13 Blood and blood management protocols	3.13 Pressure injury (ulcer) prevention protocols
	2.14 Medical equipment sterilisation protocols	3.14 Falls prevention protocols
		3.15 Acute delirium & cognitive impairment management programs
		3.16 Response to clinical deterioration
		3.17 Patient hydration and nutrition standards
		3.18 Patient identification and procedure matching protocols

Source: OECD patient safety snapshot survey 2017



# Highest and lowest impact and cost ratings for individual interventions, all respondents (n=23)

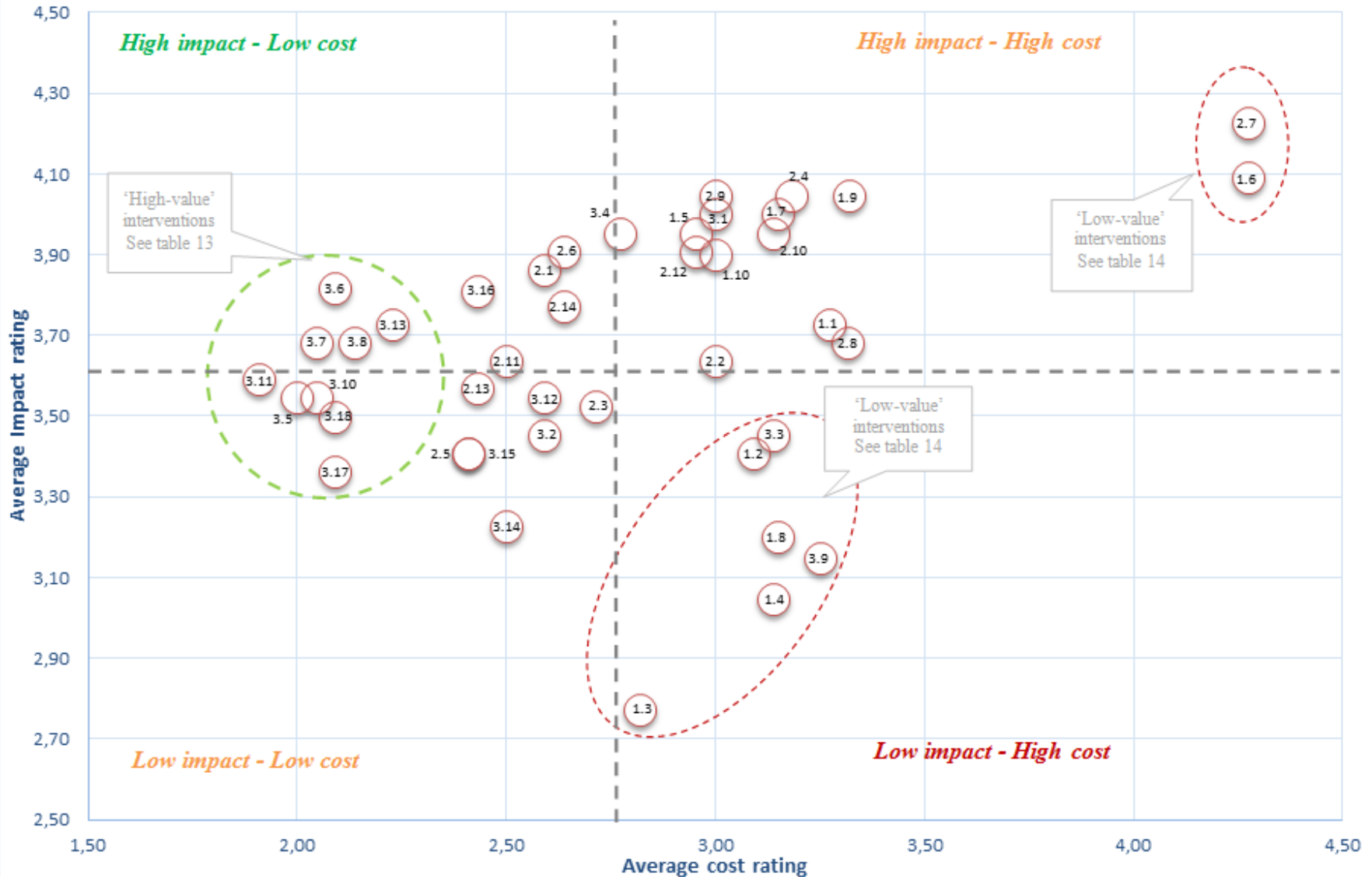
**Table 12. Highest and lowest impact and cost ratings for individual interventions, all respondents (n=23)**

Highest impact ratings		Rating	Highest cost ratings		Rating
2.7 Digital technology solutions for safety		4.23	2.7 Digital technology solutions for safety		4.27
1.6 Electronic Health Record (EHR) systems		4.09	1.6 Electronic Health Record (EHR) systems		
1.9 National interventions based on specific safety themes		4.05	1.9 National interventions based on specific safety themes		3.32
2.4 Monitoring and feedback of patient safety indicators			2.8 Human resources interventions		3.27
2.9 Building a positive safety culture			1.1 Safety Standards linked to accreditation / certification		
1.7 No-fault medical negligence legislation		4.00	3.9 Operating room integration and display checklists		3.25
3.1 Medication management / reconciliation			2.4 Monitoring and feedback of patient safety indicators		3.18
<b>Lowest impact ratings</b>			<b>Lowest cost ratings</b>		
1.3 Mandatory reporting of specified adverse events		2.77	3.11 VTE prevention protocols		1.91
1.4 Pay-for performance schemes for patient safety		3.05	3.5 Urinary catheter use and insertion protocols		2.00
3.9 Operating room integration and display checklists		3.15	3.7 Ventilator-associated pneumonia minimisation protocols		2.05
1.8 System-level public engagement and health literacy initiatives		3.20	3.10 Peri-operative medication protocols		
3.14 Falls prevention protocols		3.23	3.18 Patient identification and procedure matching protocols		2.09
3.17 Patient hydration and nutrition standards		3.36	3.17 Patient hydration and nutrition standards		
			3.6 Central line catheter insertion protocols		

Source: OECD patient safety snapshot survey, 2017



# Average impact and cost ratings for all 42 interventions (n=23)





# Most and least favourable impact/cost

**Table 13. Interventions with most favourable impact and cost ratings by average impact/cost ratio (n=23)**

Intervention	Avg. impact/cost ratio
3.11 VTE prevention protocols	1.88
3.6 Central line catheter insertion protocols	1.83
3.7 Ventilator-associated pneumonia minimisation protocols	1.80
3.5 Urinary catheter use and insertion protocols	1.77
3.10 Peri-operative medication protocols	1.73
3.8 Procedural / surgical checklists	1.72
3.18 Patient identification and procedure matching protocols	1.67
3.13 Pressure injury (ulcer) prevention protocols	1.67
3.17 Patient hydration and nutrition standards	1.61

Source: OECD patient safety snapshot survey, 2017

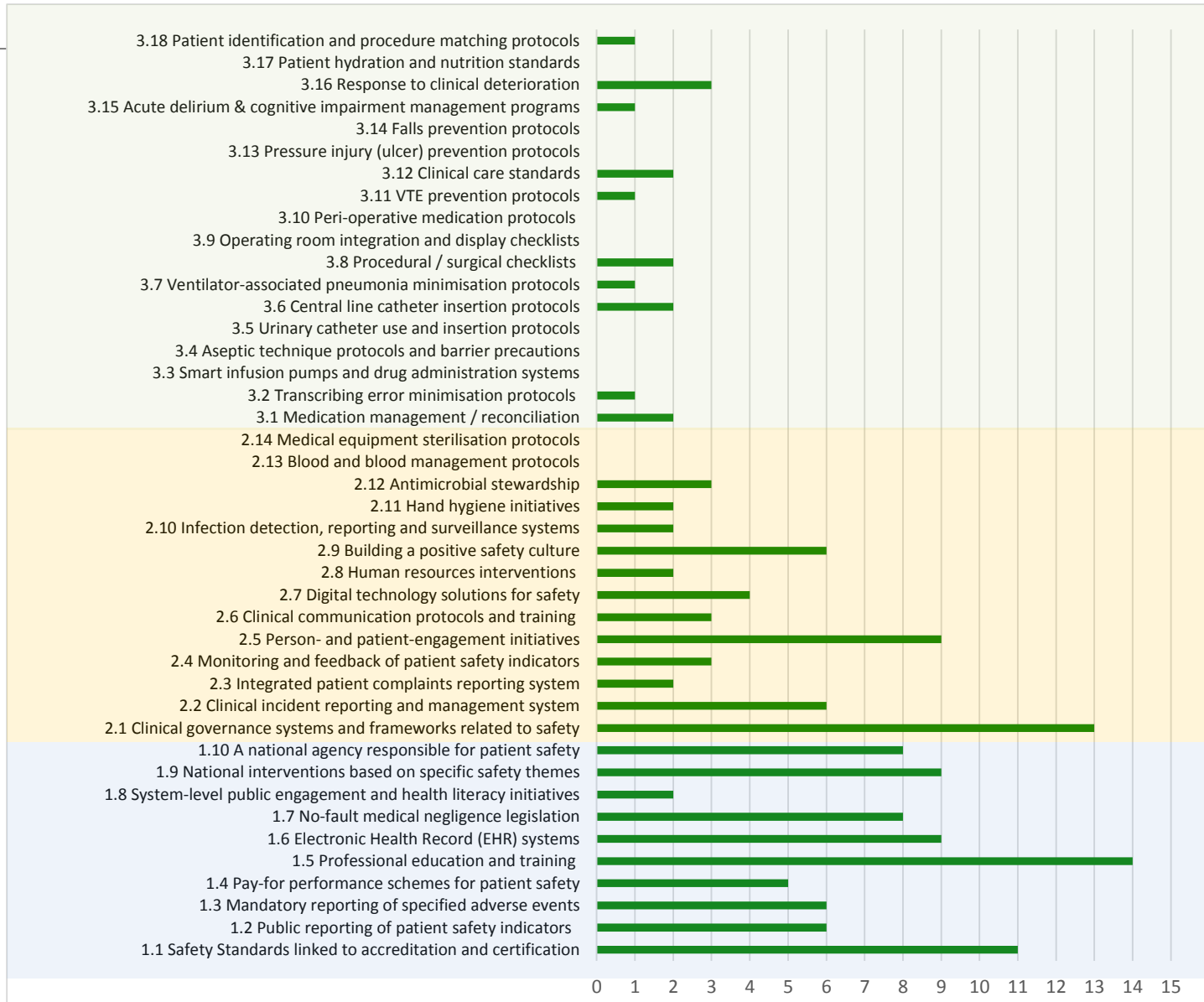
**Table 14. Interventions with least favourable ratings by quadrant and average impact/cost ratio (n=23)**

Quadrant	Intervention	Avg. impact/cost ratio
Low impact High cost	3.9 Operating room integration and display checklists	0.97
	1.4 Pay-for performance schemes for patient safety	0.97
	1.3 Mandatory reporting of specified adverse events	0.98
	1.8 System-level public engagement and health literacy initiatives	1.02
High impact High cost	2.7 Digital technology solutions for safety	0.99
	1.6 Electronic Health Record (EHR) systems	0.96

Source: OECD patient safety snapshot survey, 2017



# Frequency of interventions included in OECD context 'best buys' bundles (n=22)





## Most frequently selected for OECD countries

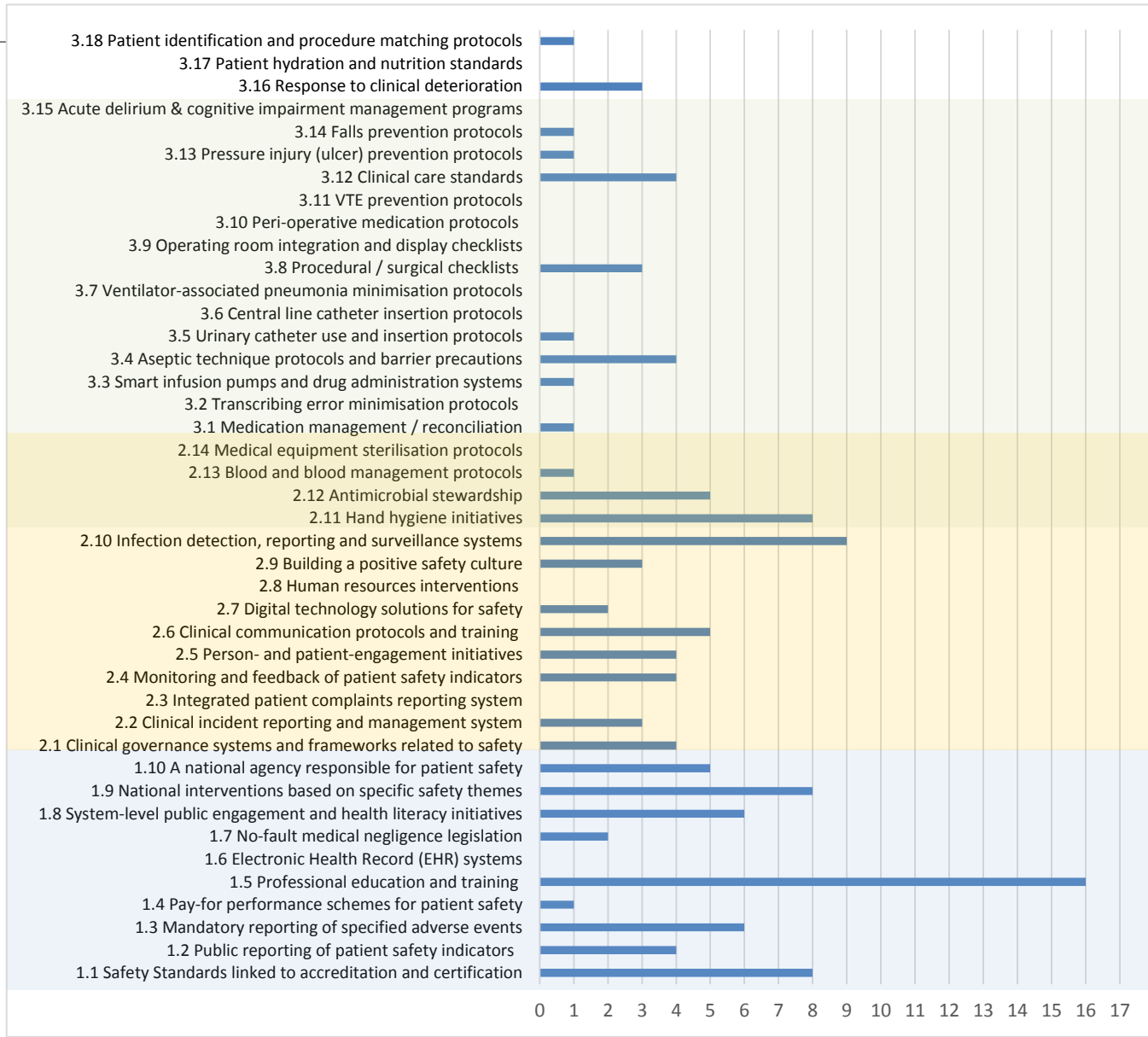
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- 1.5 Professional education and training (14 times)
- 2.1 Clinical governance systems and frameworks (13 times)
- 1.1 Safety standards linked to accreditation and certification (11 times)
- 2.5 Person- and patient-engagement strategies (9 times)
- 1.6 EHR systems (9 times)
- 1.9 National interventions based on specific safety themes (9 times)
- 1.7 No-fault medical negligence legislation (8 times)
- 1.10 A national agency responsible for patient safety (8 times).





# Frequency of interventions included in LMIC context 'best buys' bundles (n=19)



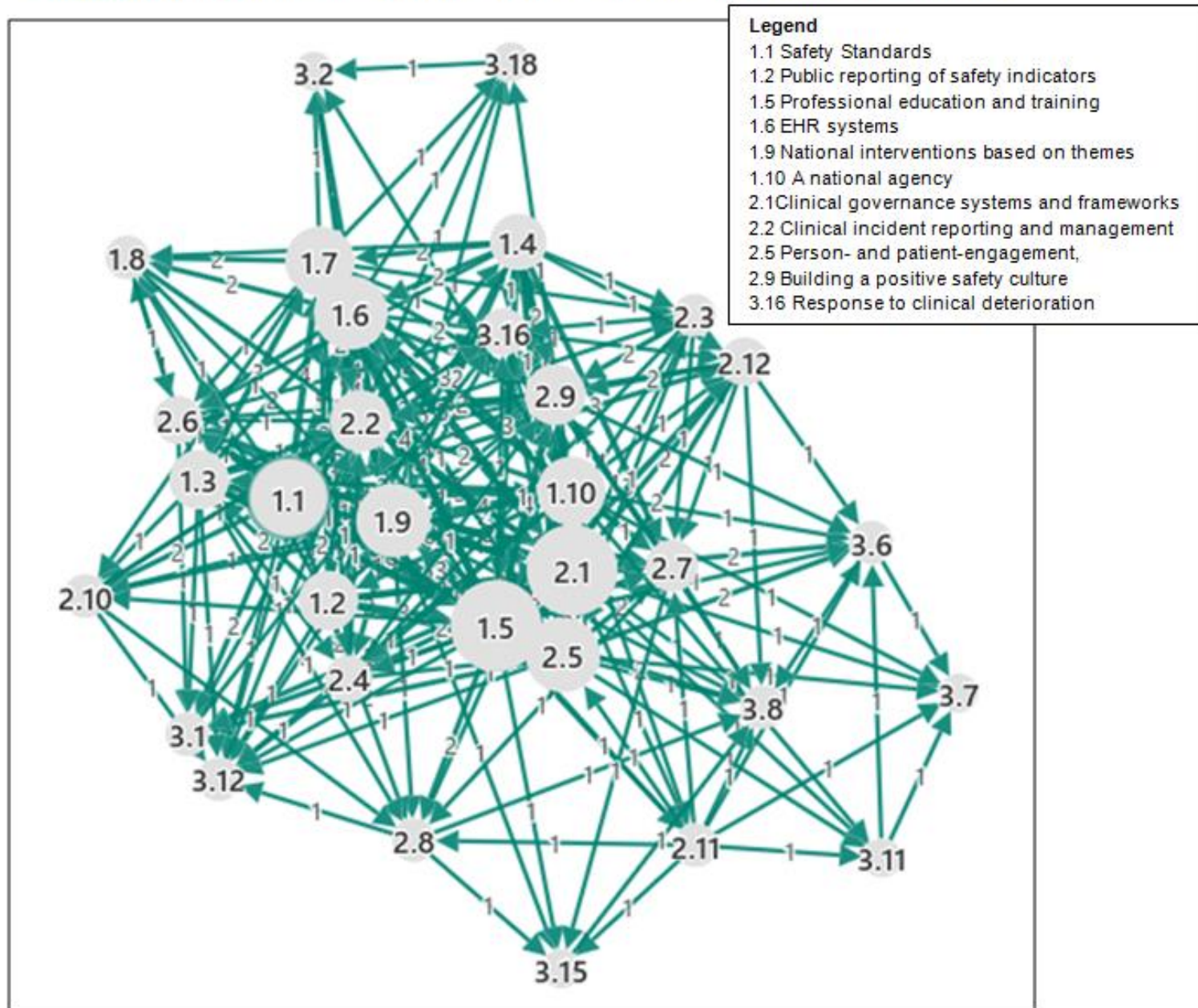


## The most frequently selected interventions for the LMIC context across all respondents

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- 1.5 professional education and training (16 times)
- 2.10 Infection detection and surveillance systems (9 times)
- 2.11 Hand hygiene initiatives (8 times)
- 1.9 National interventions based on specific safety themes (8 times)
- 1.1 Safety standards linked to accreditation and certification (8 times)

Figure 14. Network visualisation of interventions included in best buys list, OECD context



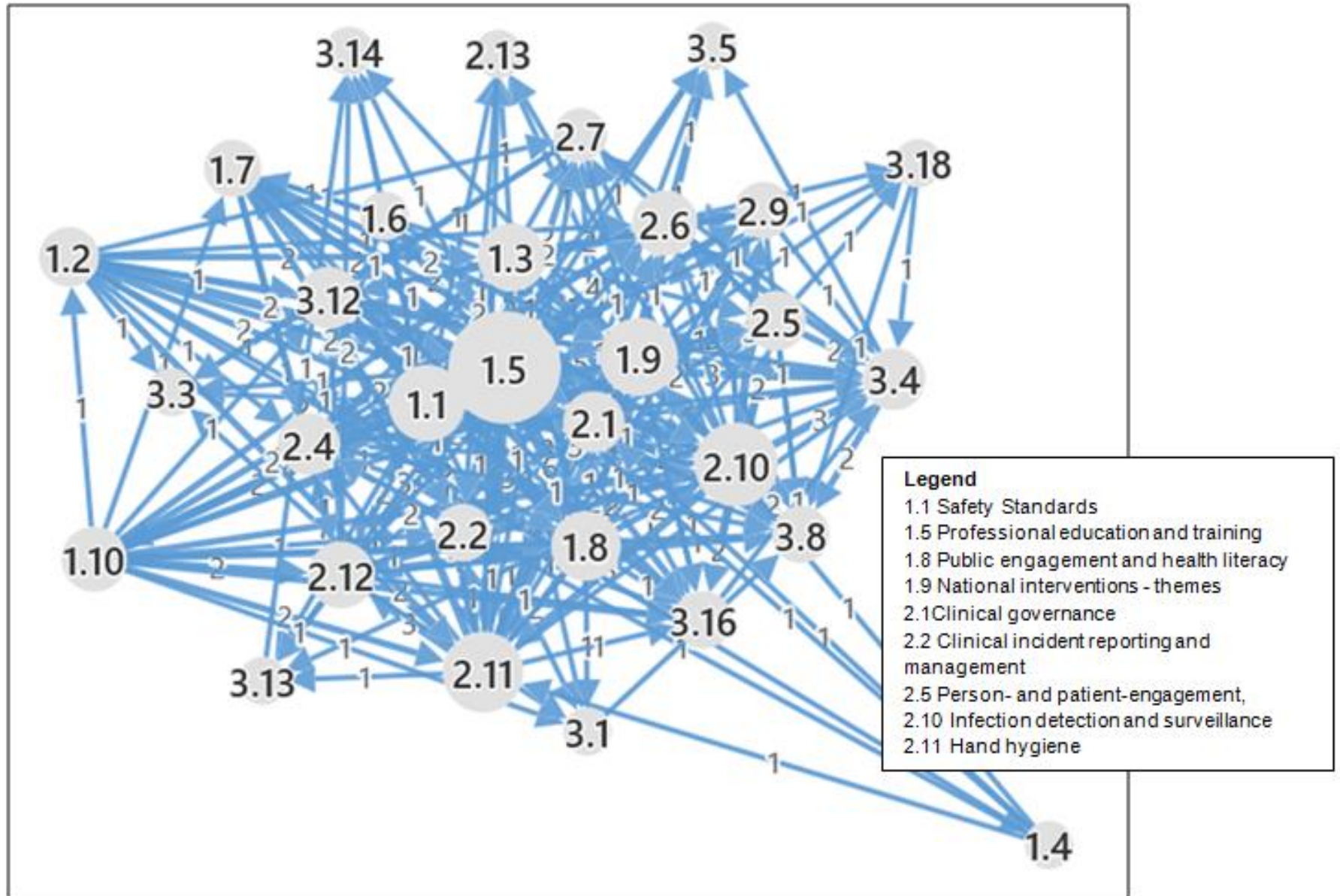


## Strong associations in the network of OECD countries

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- 1.5 Professional education and training, 2.1 Clinical governance systems and frameworks related to safety, 2.5 Person- and patient-engagement, 2.9 Building a positive safety culture and 1.10 A national agency responsible for patient safety.
- 1.1 Safety Standards linked to accreditation and certification, 1.9 National interventions based on specific safety themes, 1.2 Public reporting of safety indicators and 2.2 Clinical incident reporting and management system.

Figure 15. Network visualisation of interventions included in best buys list, LMIC context





# A systems approach to improving safety at national level

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# Key Messages Economics Patient Safety

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- Patient safety is a critical policy issue.
- The cost to patients, healthcare systems and societies is considerable
- Most of the burden is associated with a few common adverse events.
- Greater investment in prevention is justified
- Solid foundations for patient safety need to be in place
- Active engagement of providers and patients is critical.
- Innovation at the clinical level is enhanced through national leadership
- Practical approaches exist to identify national priorities for action



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Thank you

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