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Effectiveness of a bundled intervention of decolonization and prophylaxis to decrease Gram positive surgical site infections after cardiac or orthopedic surgery: systematic review and meta-analysis

Marin Schweizer,1 2 3 Eli Perencevich,1 2 3 4 Jennifer McDanel,2 Jennifer Carson,1 Michelle Formanek,2 Joanne Hafner,5 Barbara Braun,5 Loreen Herwaldt1 2 4

STUDY QUESTION
Is a bundle that includes nasal decolonization and glycopeptide prophylaxis, effective in preventing surgical site infections caused by Gram positive bacteria among patients undergoing cardiac or orthopedic surgery?

SUMMARY ANSWER
Seven studies assessed a bundle including decolonization and glycopeptide prophylaxis for only patients colonized with meticillin resistant Staphylococcus aureus (MRSA) and found a significantly protective effect against Gram positive surgical site infections.

WHAT IS KNOWN AND WHAT THIS PAPER ADDS
Surgical site infections significantly increase hospital length of stay, readmission rates, healthcare costs, and mortality rates. A bundle that included nasal decolonization and anti-MRSA prophylaxis for MRSA carriers was significantly protective against Gram positive surgical site infections.

Selection criteria for studies
In this systematic literature review and meta-analysis, we searched PubMed (1995-2011), the Cochrane database of systematic reviews, CINAHL, Embase, clinicaltrials.gov, and conference abstracts to determine the effectiveness of a bundle of interventions to prevent surgical site infections caused by Gram positive bacteria among patients undergoing cardiac or orthopaedic surgery.

Primary outcome(s)
The primary outcomes were surgical site infections caused by Gram positive bacteria and by S aureus.

Main results and role of chance
Thirty-nine studies were included. The pooled effects of 17 studies showed that nasal decolonization had a significantly protective effect against surgical site infections caused by S aureus (pooled relative risk 0.39, 95% confidence interval 0.31 to 0.50) when all patients underwent decolonization (0.40, 0.29 to 0.55) and also when only S aureus carriers underwent decolonization (0.36, 0.22 to 0.57). The pooled effects of 15 prophylaxis studies showed that glycopeptide prophylaxis was significantly protective against surgical site infections caused by MRSA compared with prophylaxis using β lactam antibiotics (0.40, 0.20 to 0.80), and a non-significant risk factor for meticillin susceptible S aureus infections (1.47, 0.91 to 2.38). Seven studies assessed a bundle including decolonization and glycopeptide prophylaxis for only patients colonized with MRSA and found a significantly protective effect against Gram positive surgical site infections.

Use of this bundle could result in cost savings since the high costs of these infections are also detrimental to publicly funded healthcare systems, such as the UK’s National Health Service.

Bias, confounding, and other reasons for caution
Of the 39 studies included in the meta-analysis, 13 were randomized controlled trials and 26 were observational studies. When we evaluated these studies using the Cochrane risk of bias tool and the Downs and Black tool, we found that the randomized controlled trials had a fairly low risk of bias and that the observational studies had good external validity but poor internal validity. Evidence of publication bias was lacking among the seven studies that evaluated the bundle to prevent Gram positive surgical site infections.

Study funding/potential competing interests
This project was funded by the Agency for Healthcare Research and Quality (contract No HHSA290200600021I) of the US Department of Health and Human Services. We have no competing interests.
ASSOCIATIONS BETWEEN THE ORGANISATION OF STROKE SERVICES, PROCESS OF CARE, AND MORTALITY IN ENGLAND: PROSPECTIVE COHORT STUDY

Benjamin D Bray,1 Salma Ayis,1,4 James Campbell,2 Alex Hoffman,2 Michael Roughton,2 Pippa J Tyrrell,3 Charles D A Wolfe,1,4 Anthony G Rudd1,4

Introduction
Although an evidence base is established from randomised controlled trials, it is not known if process measures of the quality of care predict mortality after stroke. We found an association between the organisation of stroke services and the quality of care that patients received, and that patients receiving the highest quality care had a reduced risk of mortality in the 30 days after stroke.

Methods
We carried out a prospective cohort study. Using multilevel multivariable logistic regression and instrumental variable analysis we modelled the relations between the organisation of stroke services, process measures of the quality of care, and mortality outcomes after ischaemic stroke.

Results
Three of the six process measures were associated with a reduced 30 day mortality: review by a stroke consultant within 24 hours of admission (adjusted odds ratio 0.86, 95% confidence interval 0.78 to 0.96), nutrition screening and formal swallow assessment within 72 hours (0.83, 0.72 to 0.96), and antiplatelet therapy and adequate fluid and nutrition for the first 72 hours (0.55, 0.49 to 0.61).

Discussion
Patients receiving five or six of these care processes had a reduced risk of 30 day mortality compared with those receiving 0-4 (0.74, 0.66 to 0.83). A similar result was found in the analysis using the organisational score of the admitting stroke service as an instrumental variable to control for unmeasured confounding (odds ratio 0.62, 95% confidence interval 0.46 to 0.83).

Bias, confounding, and other reasons for caution
Although the study used several approaches to reduce indication bias, the findings may be influenced by unmeasured confounding between process of care and mortality. Hospital participation in the Stroke Improvement National Audit Programme and Sentinel Stroke Audit was voluntary and we cannot exclude different case ascertainment and inclusion of patients between hospitals.

Generalisability to other populations
The findings relating to the individual process measures are specific to patients with acute ischaemic stroke. The analysis of the associations between measures of how health services are organised, the process of care that patients receive, and mortality outcomes is relevant to the study, development, and validation of quality measures in other areas of healthcare.

Study funding/potential competing interests
AGR is National Clinical Director for Stroke, NHS England. We have no other competing interests.

WHO IS KNOWN AND WHAT THIS PAPER ADDS
Although an evidence base is established from randomised controlled trials, it is not known if process measures of the quality of care predict mortality after stroke. We found an association between the organisation of stroke services and the quality of care that patients received, and that patients receiving the highest quality care had a reduced risk of mortality in the 30 days after stroke.

Participants and setting
All 36 197 adults with acute ischaemic stroke admitted to 106 English hospitals participating in the Stroke Improvement National Audit Programme and Sentinel Stroke Audit from 1 April 2010 to 30 November 2011.

Design, size, and duration
We carried out a prospective cohort study. Using multilevel multivariable logistic regression and instrumental variable analysis we modelled the relations between the organisation of stroke services, process of care, and mortality.

Main results and the role of chance
Three of the six process measures were associated with a reduced 30 day mortality: review by a stroke consultant within 24 hours of admission (adjusted odds ratio 0.86, 95% confidence interval 0.78 to 0.96), nutrition screening and formal swallow assessment within 72 hours (0.83, 0.72 to 0.96), and antiplatelet therapy and adequate fluid and nutrition for the first 72 hours (0.55, 0.49 to 0.61).
Consumers’ estimation of calorie content at fast food restaurants: cross sectional observational study

Jason P Block,1 Suzanne K Condon,2 Ken Kleinman,1 Jewel Mullen,3 Stephanie Linakis,1 Sheryl Rifas-Shiman,1 Matthew W Gillman1 4

**STUDY QUESTION**
How accurate are adults, adolescents, and parents of school age children in estimating the calorie content of their meals at fast food restaurants?

**SUMMARY ANSWER**
Participants dining at most fast food restaurants underestimated calorie content of purchased meals, especially large meals.

**WHAT IS KNOWN AND WHAT THIS PAPER ADDS**
Consumers tend to underestimate the calorie content of fast food restaurant meals, especially for high calorie meals, though previous studies have been conducted in experimental settings, focused on a narrow range of fast food restaurants, or had limited racial/ethnic or age group diversity. In this study among diverse racial/ethnic groups visiting six fast food restaurant chains, we found that adults, adolescents, and parents of school age children underestimated calorie content of meals.

**Participants and setting**
In 2010 and 2011, we enrolled 1877 adults (aged 18 and over) and 330 school age children (aged 3-15) visiting restaurants after school or during lunchtime in four cities in New England, United States.

**Design**
This study used a repeated cross sectional design with multiple visits to each of 89 fast food restaurants across the study area. Over the two years of data collection, we made 625 restaurant visits.

**Primary outcome**
The primary outcome included study participants’ estimation of calorie content of purchased meals. For the school age children sample, their accompanying parent or legal guardian provided the estimate.

**Main results and the role of chance**
Among those we approached, we enrolled 40% of adults, 42% of adolescents, and 45% of parents with school age children in this study. The mean (SD) actual calorie content of purchased meals was 836 calories (465), 756 calories (455), and 733 calories (359) for adults, adolescents, and school age children (one calorie is equivalent to 4.18 kJ). The mean differences between estimated and actual calorie content were underestimates of 175 calories (95% confidence interval 145 to 205), 259 calories (227 to 291), and 175 calories (108 to 242), respectively. Nearly a quarter of participants in each sample underestimated calorie content by 500 or more calories. The mean underestimation was larger among Subway diners than at other chains for adults (349 calories, 95% confidence interval 293 to 406) and adolescents (500, 429 to 571) with similar values for all chains among school age children. With McDonald’s diners as the reference, adult diners at Subway and Burger King had significantly more underestimation of calorie content as did adolescent diners at Subway (P<0.001). Adolescent diners at Dunkin’ Donuts had less underestimation of meal calorie content than McDonald’s diners. In multivariable models, estimated calorie content of meals was strongly associated with actual calorie content for each of the samples. Adults and adolescents dining at Subway estimated 20% (4% to 34%) and 25% (1% to 43%) lower calorie content than McDonald’s diners. Black people, Hispanics, Asians, and “other” race/ethnicity or multiracial adults and adolescents estimated lower meal calorie content than white people.

**Bias, confounding, and other reasons for caution**
Because more than half of eligible individuals did not participate, the participants in our study might not represent all customers of the restaurants. We also could not enrol diners in the drive through section of restaurants, who might be different than those walking into restaurants, and we could not weigh food to measure actual calorie consumption.

**Generalisability to other populations**
We enrolled a diverse sample of participants in four large cities in New England; 18-38% were white and 49-63% were of black or Hispanic race/ethnicity.

**Study funding/potential competing interests**
Funders for this study included the National Heart, Lung, and Blood Institute of the National Institutes of Health, the Robert Wood Johnson Foundation’s Health and Society Scholars and Healthy Eating Research programs, and the Robert H Ebert Fellowship, funded by the Harvard Pilgrim Health Care Foundation through the Eleanor and Miles Shore Fellowship Program at Harvard Medical School.
Helmet legislation and admissions to hospital for cycling related head injuries in Canadian provinces and territories: interrupted time series analysis

Jessica Dennis, 1 Tim Ramsay, 2 Alexis F Turgeon, 3 Ryan Zarychanski 4

STUDY QUESTION
Is provincial bicycle helmet legislation associated with a reduction in the rate of admissions to hospital for cycling related head injuries among young people and adults in Canada?

SUMMARY ANSWER
Reductions in the rates of hospital admissions for cycling related head injuries were greater in provinces with helmet legislation, but injury rates were already decreasing before the implementation of legislation, and the rate of decline was not appreciably altered by legislation. In the context of Canada’s existing safety campaigns, improvements to the cycling infrastructure, and the passive uptake of helmets the incremental contribution of provincial helmet legislation to reduce hospital admissions for cycling related head injuries seems to have been minimal.

WHAT IS KNOWN AND WHAT THIS PAPER ADDS
Published controlled before and after studies among young people suggest a protective effect of helmet legislation on cycling related head injuries. Most of these studies, however, did not account for existing trends in cycling related injury rates, nor did they investigate the association between helmet legislation and head injuries in adults. Our analyses included both young people and adults and we explicitly modeled baseline trends in the rate of cycling related head injuries.

Participants and setting
This study included all admissions (n=66 716) to acute care hospitals in Canada owing to cycling related injury between 1994 and 2008. Between 1994 and 2003, six of 10 Canadian provinces implemented helmet legislation.

Main results and the role of chance
Among young people the rate of head injuries in provinces with helmet legislation decreased by 54.0% (95% confidence interval 48.2% to 59.8%) compared with 33.1% (23.3% to 42.9%) in provinces and territories without legislation. In the context of Canada’s existing safety campaigns, improvements to the cycling infrastructure, and the passive uptake of helmets the incremental contribution of provincial helmet legislation to reduce hospital admissions for cycling related head injuries seems to have been minimal.

Bias, confounding, and other reasons for caution
Concurrent interventions to improve cycling safety may have biased associations between helmet legislation and admissions to hospital for head injuries. In some provinces, the power of the segmented regression analysis may have been reduced by too few prelegislation time points or few injuries at each time point.

Generalisability to other populations
Although this study is based on Canadian data, similar results could be expected anywhere helmet legislation is a component of a comprehensive strategy to reduce cycling related injuries.

Study funding/potential competing interests
JD is a Canadian Institute of Health Research Vanier graduate scholar, AFT is a recipient of a research career award from the Fonds de la Recherche du Québec-Santé, and RZ is a recipient of a RCT-mentorship award from the Canadian Institute of Health Research. We have no competing interests.