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Journal:	*BMJ Open*
Manuscript ID	bmjopen-2016-014064
Article Type:	Research
Date Submitted by the Author:	28-Aug-2016
Complete List of Authors:	Cunningham, Nicola; Monash University, Department of Forensic Medicine Pham, Tony; Monash University, Department of Forensic Medicine Kennedy, Briohny; Monash University, Department of Forensic Medicine Gillard, Alexander; Monash University, Department of Forensic Medicine Ibrahim, Joseph E.; Monash University, Department of Forensic Medicine
Primary Subject Heading:	Medical education and training
Secondary Subject Heading:	Legal and forensic medicine
Keywords:	Coroners, Practice change, Printed educational material, patient safety, narrative case reports, death prevention

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Evaluation of electronic educational material written by clinicians, for clinicians- Demonstrating practice change as a result of reading the Clinical Communiqué

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Word count: 2496

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Abstract

Objective: To explore whether subscribers declared clinical practice changes as a result of reading the Clinical Communiqué (CC). Secondarily, to compare the characteristics of subscribers who self-reported changes to clinical practice with those who did not, and to explore subscribers' perceptions of the educational value of the CC

Design, setting and participants: Online cross-sectional survey between 21st July 2015 to 18th August 2015 by subscribers of the CC (response rate=44.15%, 1,008/2,283)

Main outcome measures: Change in clinical practice as a result of reading the CC

Results: 496 (53.0%, 496/936) respondents reported that their practice had changed after reading the CC. Respondents also found that the CC raised awareness (96.5%, 912/945) and provided ideas about improving patient safety and care (94.1%, 889/945), leading them to discuss cases with their colleagues (79.6%, 752/945) and review their practice (75.7%, 715/945). Multivariate analysis indicated that working in a residential aged care facility and having taken part in an inquest, were significantly associated with practice change.

Conclusions: The design and content of the CC has generated a positive impact on the healthcare community. It is presented in a format that appears to be accessible and acceptable to readers and achieves its goals of promoting safer clinical care through greater awareness of the medico-legal context of practice.

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Strengths and limitations of this study

- This study evaluates the effect that the Clinical Communiqué (CC) has on its readers in terms of practice change
- There was a substantial number of respondents with over 1000 subscribers participating in the survey
- The response rate is double (44%) that which is usually obtained in online surveys (20%)
- The self-reported change to practice of 53.0% (496/936) is likely an overestimate, however, there is substantive corroboration with 109 subscribers (13%) agreeing 'that if CC was not available, change would not have occurred'
- A control group was not used in our study

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Introduction

Throughout the developed world, about 10% of hospital admissions are associated with an adverse event.[1] The examination of adverse events in healthcare settings is a tool whereby practical information can be generated to stimulate incentives for change at many levels. However, clinical behaviour is notoriously resistant to change.[2] At an individual level, barriers to, and incentives for change include: awareness, knowledge, attitude, motivation, and behavioural routines.[3] Systemic organisation factors include change fatigue, resource limitations, restructuring and workplace culture.[4]

In general, adverse events and patient harm in healthcare settings occur through errors of commission or errors of omission. Errors of commission often manifest as single high-profile catastrophic events, whereas, errors of omission are more pervasive and difficult to identify.[5] The latter often require careful evaluation to reveal the interplay between remote or unseen factors that may have led to the errors.

In the pursuit of improving patient safety, medico-legal death investigations in healthcare settings allows for identification of areas suitable for change. Inquests provide a forum within which a coroner conducts a detailed analysis of events that contributed to a patient's death. Errors are explored and questions of 'why', 'what', 'where', and 'who' in relation to practice change can be addressed in the coroner's comments and recommendations.

Accessibility of this information to healthcare professionals may be limited by the legal format and technical language of coronial findings. The Clinical Communiqué (CC) is an electronic educational publication that encourages practice change by providing coronial information regarding preventable deaths in acute hospital and community settings. In order to optimize

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the impact and dissemination of this important information, a relevant clinical context is combined with accessible language and up-to-date expertise (Box 1). The CC contains narrative case reports about lessons learned from coroners' investigations and its target audience is healthcare professionals, clinicians and managers.[6]

Aim

The primary aim of this study was to explore whether subscribers declared clinical practice changes as a result of reading the CC. It also compared the characteristics of subscribers who self-reported changes to clinical practice with those who did not, and explores subscribers' perceptions of the educational value of the CC.

Method

Study Design and Setting

A population-based cross-sectional study was conducted, using an anonymous electronic survey distributed to all registered subscribers of the Clinical Communiqué (CC). A team from the Monash University conducted the survey from July to September in 2015.

Survey Instrument

The survey instrument was refined from previous studies to address the study objectives.[7-9] This involved the refinement of the questionnaire through the changing of phrasing, the addition of new questions and the modification of previous questions by researchers with extensive knowledge of the health care system to make clear the premise of each item within the questionnaire. The questionnaire was then piloted with ten health professionals (five

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nurses and five doctors) and after reviewing the feedback, the survey was further refined. The final questionnaire was designed and distributed through the open-source web-based application Survey Monkey.

The questionnaire consisted of 33 questions divided into three primary sections: respondent reading behaviour and evaluation of the CC (10 questions); the impact of the CC, including details of practice change (13 questions); and respondent characteristics (10 questions). A change in practice required the respondent to identify the following elements: location (e.g. inpatient ward), discipline involved (e.g. medical staff), nature (e.g. education, policy, clinical care), edition of the CC that influenced change, impact on subject (e.g. patient, staff), action taken (e.g. new initiative). The survey instrument consisted of all closed-ended questions, with six providing an option to provide further comments. The closed-ended questions were multiple choice, categorical, dichotomous, and Likert type questions with 5 point rating scales. Only respondents who reported changing practice after reading the CC were able to answer questions about changes in professional practice. No identifying data was collected.

Study Population

The survey was sent out via email by study investigator through the MailChimp service to all registered subscribers of the CC at the time the study was conducted, and for whom an email address was available. A modified Dillman protocol[10] was used to guide subscriber participation. Subscribers were contacted directly and asked to respond to the survey on the 21st July, 2015. Two weeks later, a follow-up reminder email was sent to subscribers and a final reminder email was sent after a further two weeks. Respondent anonymity was maintained and the researchers blinded by using the web-based survey tool for collection and collation of data.

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The electronic system automatically identified the non-responders and reminder notices were only sent to subscribers who had not responded to the previous email(s).

Data Analysis

Survey responses were analysed using Statistical Package for the Social Sciences (SPSS) version 20.0 (SPSS, Inc., Chicago, IL). Descriptive statistics were used to summarise information about respondents' reading behaviour and preferences, the impact of the CC, the nature of self-reported changes to practice and characteristics of the respondents.

Responses to questions answered along an ordinal 5-point Likert-scale were reported using the median and interquartile range, and dichotomised: "yes" consisted of 5 (strongly agree) and 4 (agree), whereas "no" consisted of 3 (neutral), 2 (disagree) and 1 (strongly disagree). The ordinal data was collapsed into dichotomous groups as a conservative approach to the analysis using non-parametric tests. Missing data was analysed using pairwise deletion.

Cronbach's alphas were used to estimate the internal reliability of items relating to respondent opinion about CC content (6 items) and influence on professional practice change (4 items). Cronbach's alphas were estimated using the entire sample of participants.

Bivariate analysis was used to compare the characteristics of respondents who self-reported change in practice with those who did not. Characteristics including respondents' age, gender, professional role, years of experience, frequency of client interaction, practice setting, contact with the Coroners Court and reading behaviour, were analysed using the chi-square test.

Multivariate logistic regression was used to analyse factors associated with readers who reported change in practice compared to those who did not. Factors were included in the regression analysis if $p<0.25$ in bivariate analysis[11] or were thought to be important based on

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expert opinion of senior clinical medical and nursing staff with over 10 years' experience in medico-legal death investigations. Reference categories were selected based on the category with the largest number of people as this would be the most robust denominator. Collinearities were identified using a pairwise correlations matrix with r>0.40 interpreted as evidence of collinearity.

Ethics Approval

Institutional ethics approval for this study to proceed was granted from the Victorian Institute of Forensic Medicine Research Advisory and Ethics Committee. Implicit consent for the project was considered when the study participants completed the survey.

Results

Of the 3,385 listed subscribers, 3,373 had valid email addresses. Of these, 2,283 subscribers opened the email containing the questionnaire. A subsequent 1,008 individuals completed the survey giving a response rate of 44.15% (1,008/2,283). All respondents provided valid responses. Cronbach's alphas demonstrated good internal consistency for opinion about CC content (0.93) and influence on practice change (0.87).

Respondent demographic and occupational characteristics

The demographics of the respondents are shown in Table 1. Of the 1008 respondents, most were at or over the age of 45, the majority had worked for over 10 years, and there were more females than males. The most commonly identified roles were medical practitioner or nurse. A large proportion worked in clinical roles in Victorian hospitals.

Respondent reading behaviour and preferences

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The majority of respondents reported reading all or almost all of each CC issue and approximately half had read all four issues of the CC. Most read the CC as soon as it arrived, and a large proportion used it as a teaching aid. The section most often read was the case summaries (Table 1).

Respondent evaluation of the CC

Table 2 shows the respondents' opinions on the content and efficacy of the CC. A large majority agreed that the content of the CC was useful, reliable, timely, easy to understand, and written in plain language. Respondents also found that the CC raised awareness and provided ideas about improving patient safety and care, leading them to discuss cases with their colleagues and review their practice. The case summaries and expert commentary sections were found to be the most useful in aiding the respondents to improve patient care. The length of the CC was regarded as *'just right'* by most of the respondents, and almost all '*would recommend the CC to their colleagues'* (Table 2).

Nature and significance of self-reported change to practice

496 (53.0%, 496/936) respondents reported that their practice had changed after reading the CC. Details regarding the nature of practice change are shown in Table 3. The majority of change was reported to have occurred in staff, at inpatient wards, or residential aged care facilities, with respect to education and training and clinical practice, involving one or two discipline groups.

Approximately one quarter of respondents reported that without the CC, change would not have occurred. A larger proportion agreed that the change would have taken longer and occurred on a smaller scale (Table 3).

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Characteristics and factors associated with respondents who reported change

In bivariate analysis, respondents' age, professional role, and workplace location were found to be significantly associated with practice change.

Multivariate analysis indicated that working in a residential aged care facility and having taken part in an inquest, were significantly associated with practice change. Conversely medical practitioners and pharmacists under the age of 35 years, working in workplaces with minimal patient contact (less than 1 day per week) who had only read 2 or less CC issues, were less likely to change their practice.

Discussion

This population-based cross-sectional study found the CC prompts readers to initiate change in their professional practice to improve patient safety. With a response rate higher than the predicted average rate of 20-30% for online surveys, and almost double what has been described to meet stringent conditions for response rates when sampling large groups,[12] this study adds to the existing literature on the value of electronic case summaries and commentaries in reaching and influencing the practice of healthcare professionals.

There are many recognised benefits of printed and electronic educational material (PEM). The material is an effective and low cost method of raising awareness. The format and layout can be tailored to appeal to a particular audience to inspire behaviour change. PEM is most effective when combined with other methods, such as using the influence of opinion leaders to disseminate information.[13]

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The majority of respondents were clinicians who had worked for more than 10 years, suggesting that the CC appeals not only to junior staff in the early phases of their career path, but also to experienced staff in senior roles. The benefits of having a readership that spans all levels of seniority in a healthcare setting, is that change can take place at the frontline, in the day-to-day aspects of patient care, and also at the policy-making end by staff in positions of clinical and organisational leadership.

The reading behaviour of the respondents showed that there was an overwhelmingly positive and immediate response to the release of each CC issue. Many respondents forwarded the CC to their colleagues, or printed and distributed the issue in communal areas, leading to an estimated reach of more than 28,000 people (Box 2). Clearly not all who read the CC will become subscribers, however the scale of opportunity to raise awareness and provide ideas about improving patient safety should not be underestimated. It is the very nature of raising awareness that may impart the greatest benefit in influencing practice change. In this study, 97.6% (409/419) of respondents who self-reported practice change selected 'raising awareness of an issue' as directly contributing to the change.

Limited information is available from quantitative studies to understand the relationship between education and change in clinical practice. Education provides one-sixth of the reasons for changes in clinical practice, and is involved in one-third of the changes.[14] In this study, 53.0% (496/936) of respondents reported a practice change after reading the CC. More than 90% of respondents reported that the CC provided ideas about improving patient safety and care and 75.7% (715/945) of respondents had reviewed their practice. This compares favourably to an

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earlier study where just under half (41.6%, 290/697) of responding subscribers changed their practice.[8]

The CC does not provide rigid guidelines. Instead it provides information that is relayed in the classic human narrative form of story-telling. This is non-hierarchical and the lessons are presented in context. Not only is this form of PEM thought-provoking, it stimulates dialogue between colleagues. 62.4% (590/945) of respondents reported using the CC as a teaching aid, suggesting they not only read it for personal interest but find the cases and topics highly relevant to their work and view the material as an appropriate educational resource. Reading individual cases of patient deaths engenders self-reflection and self-assessment, and encourages healthcare professionals to ask: can this happen to my patient?

An important finding was that a quarter of all respondents (26.0%, 109/419) attributed a practice change solely to reading the CC. Of those that felt a practice change would have occurred eventually, the majority acknowledged that the change would have been smaller and taken longer.

The survey questions did not explore the extent to which 'practice change' was conceived. Instead, this study focused on more tangible outcomes such as projects and initiatives as indicators of practice change. Subtle changes such as a change in communication, or simply reflecting on a case during a patient-interaction was not asked about, but could occur on a much more frequent basis and may influence practice in ways that are harder to measure.

The findings that medical practitioners and pharmacists under the age of 35 years and working with minimal patient contact were less likely to change their practice as a result of reading the CC, may suggest that the educational relevance was not as applicable to their working roles and

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environment. The cases were predominantly set in hospital wards, and the key messages were largely centred around staff tasked with responding to an acutely unwell patient.

A limitation of this study is that subscribers were asked to participate and discuss practice change after only four issues had been released. Clinical guidelines can take up to three years to be fully implemented.[13]

Another limitation of this study is that the scope did not allow the investigators to examine in detail the changes that were reported, or whether the practice changes sustained over time. Therefore, quantifying the risk reduction and lives saved is not possible. Also, control groups were not utilised.

Conclusion

Investigations into patient deaths identify preventable errors and enhance knowledge of the many risks to patients that exist in the healthcare setting. The design and content of the CC has generated a positive impact on the healthcare community. It is presented in a format that appears to be accessible and acceptable to readers and achieves its goals of promoting safer clinical care through greater awareness of the medico-legal context of practice.

Contributors

JEI contributed to conception, design and development of the study, assembly of the survey and revising the manuscript critically for important intellectual content; and as senior author is accountable for all aspects of the work in ensuring that questions related to the accuracy or

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integrity of any part of the work are appropriately investigated and resolved. **NC** contributed to development of the survey, was involved in drafting the manuscript and revising it critically for important intellectual content. **TP** performed the statistical analysis was involved in drafting the manuscript and revising it critically for important intellectual content. **BK** contributed to development of the study, was involved in revising the manuscript critically for important intellectual content. **AG** contributed to development, distribution, monitoring and collation of the survey. All authors read and approved the final manuscript.

Funding

The Victorian Managed Insurance Authority (VMIA) funded this study.

Competing interests

JEI and NC are directly involved in the production of the "Clinical Communiqué". Otherwise the authors have no competing interests

Data Sharing

No additional data are available.

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Boxes and Tables

Box 1.

History of the Clinical Communiqué

The CC was launched in September 2014 as a revamped version of the Coronial Communiqué. Established in 2003, the Coronial Communiqué represented the first serial electronic publication of narrative case reports about clinical lessons learned from patient deaths investigated by the Victorian Coroner's Office.[15] Twenty-one editions were released before it went into a hiatus in 2009 due to resource constraints. In its current form, the CC is published quarterly and uses coronial cases from local, interstate, and international jurisdictions to explore the challenges that clinicians face every day in providing clinical care. Each issue identifies key themes that are vital to improving patient safety such as communication, supervision, decision-making, and recognising the deteriorating patient. Many of the themes are reflected in the National Safety and Quality Health Service Standards.[16] These are presented as case summaries and expert commentaries.

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Table 1. Demographic and occupational characteristics and respondent reading behaviour (N=1008)

Demographic and occupational characteristics		n	%
Age (years)[a]			
	≤34	101	11.6
	35-44	196	22.5
	45-54	308	35.3
	≥55	268	30.7
Gender[a]			
	Female	643	73.7
	Male	230	26.3
Professional Role[a]			
	Allied Health Professional	25	2.9
	Medical Practitioner	240	27.5
	Nurse	277	31.7
	Paramedic	24	2.7
	Pharmacist	35	4.0
	Quality and Risk Manager	99	11.3
	Other	173	19.8
Experience in profession (years)[a]			
	≤5	183	21.0
	6-10	130	14.9
	11-15	115	13.2
	16-20	86	9.9
	≥21	359	41.1
Workplace setting[a]			
	Government Department/Agency	41	4.7
	Hospital – Acute	451	51.7
	Hospital – Subacute	47	5.4
	Primary Care	72	8.2
	Residential Aged Care Service	109	12.5
	University or Other Academic	32	3.7
	Other	121	13.9
State or country[a]			
	Victoria	549	62.9
	Other State or Territory of Australia	313	35.9
	Other Country	11	1.3

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Frequency of patient interaction per week (days)[a]		
Less than one	230	26.3
One	58	6.6
Two or three	107	12.3
Four or more	478	54.8
Level of contact with Coroners Court[a]		
Taken part in an inquest	148	17.0
Provided a statement	207	23.7
Contacted Court to discuss if death was reportable	338	38.7
Contacted Court for other reasons	289	33.1
No contact	299	34.2
Respondent Reading Behaviour and Preferences	**n**	**%**
Respondent reading behaviour		
Read all 4 issues[b]	466	47.1
Read all or almost all of each issue[c]	747	79.0
Respondents regularly read the following sections[d,e]		
Case summaries	927	99.3
Expert commentary	916	98.0
Editorial	821	88.1
Resources list	525	56.6
Use of the Clinical Communiqué[c,e]		
I read it as soon as it arrives	802	84.9
I encourage my colleagues to read it	681	72.1
I refer to it in my job	407	43.1
I use it as a teaching aid	590	62.4

[a]135 respondents failed to answer this question and were not included in the analysis (N=873)

[b]19 respondents failed to answer this question and were not included in the analysis (N=989)

[c]63 respondents failed to answer this question and were not included in the analysis (N=945)

[d]The number of respondents varies for this question (N=934, 935, 932, 928) respectively

[e]Five-point Likert scale, 5=strongly agree to 1=strongly disagree. Positive responses are counted as the sum of responses that stated 'strongly agree' and 'agree'

NB. Because of rounding not all percentages cumulatively sum to 100

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Table 2. Respondent Evaluation Criteria (N=1008)

Respondent Evaluation Criteria	n	%	Median (25th-75th percentile)
Information given in the Clinical Communiqué is:[a,b]			
Useful	928	99.2	5 (4-5)
Reliable	907	96.9	5 (4-5)
Timely	728	77.8	4 (4-5)
Easy to understand	912	97.4	5 (4-5)
Written in plain language	917	98.0	5 (4-5)
The following sections of the Clinical Communiqué are useful for improving patient care:[a,b]			
Case summaries	922	98.5	5 (4-5)
Expert commentary	914	97.7	5 (4-5)
Editorial	799	85.4	4 (4-5)
Resources list	628	67.1	4 (3-4)
Reading the Clinical Communiqué[b,c]			
Raised awareness about improving patient safety and clinical care	912	96.5	5 (4-5)
Provided ideas for improving safety and clinical care	889	94.1	4 (4-5)
Prompted me to discuss cases with colleagues	752	79.6	4 (4-5)
Prompted me to review my practice	715	75.7	4 (4-4)
The length of the Clinical Communiqué is just right[a]	766	81.8	–
I would recommend the Clinical Communiqué to my colleagues[a,d]	927	99.0	5 (5-5)

[a]72 respondents failed to answer this question and were excluded from analysis (N=936)
[b]63 respondents failed to answer this question and were excluded from analysis (N=945)
[c]Five-point Likert scale, 5=strongly agree to 1=strongly disagree. Positive responses are counted as the sum of responses that stated 'strongly agree' and 'agree'
[d]Five-point Likert scale, 5 = definitely yes to 1 = definitely not. Positive responses are counted as the sum of responses that stated 'definitely yes' and 'probably yes'.

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Table 3. Details of self-reported change to practice (N=496)

Characteristics of practice change	n	%
Workplace[a]		
Emergency department	89	21.2
Intensive care unit	42	10.0
Operating theatre	51	12.2
Inpatient ward	146	34.8
Outpatient unit primary care	47	11.2
Residential aged care facility	119	28.4
Other	92	22.0
Who was involved in the practice change?[a]		
One discipline group (e.g. doctors only)	157	37.5
Two discipline groups (e.g. doctors and nurses)	188	44.9
Three discipline groups (e.g. doctors, nurses and pharmacists)	48	11.5
Four or more discipline groups	38	9.1
Practice change was related to[a]		
Education and training	286	68.3
Policy, procedures and protocols	182	43.4
Clinical practice	283	67.5
Evaluation of care	142	33.9
Documentation of practice	205	48.9
Improving staff morale/attitude	122	29.1
Environment/equipment	65	15.5
Edition of the Clinical Communiqué which influenced practice change[a]		
'Communiqué cases and the National Health Service Standards'	124	29.6
'Recognising early warning signs of the deteriorating patient'	341	81.4
'Communication and decision making at the bedside'	253	60.4
'Responding as a team to medical emergency'	191	45.6
The practice change had an impact on[a]		
Patient care	339	80.9
Staff	380	90.7
Environment	215	51.3
Organisation	268	64.0
The action taken in the practice change was to[a]		
Introduce a new initiative	71	16.9
Alter or modify an existing initiative	382	91.2
Discontinue an existing initiative	24	5.7

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Number of initiatives where the Clinical Communiqué was used to change practice[a]		
One	151	36.0
Two	175	41.8
Three	63	15.0
Four	12	2.9
Five or more	19	4.5
Degree to which the Clinical Communiqué influenced practice change[a,b]		
Selecting area of improvement	306	73.0
Defining the scope of the project	173	41.3
Engaging senior management	189	45.1
Engaging point of care staff	276	65.9
Identifying required resources	203	48.5
Setting project timelines	76	18.1
Gathering background research/analysis	227	54.2
The Clinical Communiqué influenced practice change[a,c]		
By raising awareness of an issue	409	97.6
By engaging staff	354	84.5
Because of the authority of the publication	310	74.0
By suggesting improvement strategies	359	85.7
By prompting staff to evaluate their existing practice	369	88.1
If the Clinical Communiqué had not been available, the change would have[a,c]		
Happened anyway	129	30.8
Taken longer	347	82.8
Happened on a smaller scale	236	56.3
Not occurred	109	26.0

[a]77 respondents failed to answer this question and were excluded from analysis (N=419)
[b]Five-point Likert scale, 5=strongly agree to 1=strongly disagree. Positive responses are counted as the sum of responses that stated 'strongly agree' and 'agree'
[c]Five-point Likert scale, 5=extremely influential to 1=not at all influential. Positive responses are counted as the sum of responses that stated 'extremely influential' and 'very influential'

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Box 2.

Reach of the Clinical Communiqué

As the CC is delivered via email, it is difficult to determine exactly how many people are being exposed to the contents of the CC. Therefore by asking respondents how many people have access to the CC at their workplace, it was calculated that for this sample of 1,008 respondents, the CC reached between 28,575 and 30,958 people. Therefore, each person on average, shared the CC with at least 9 other people.

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A cross-sectional survey using electronic distribution of a questionnaire to subscribers of educational material written by clinicians, for clinicians, to evaluate whether practice change resulted from reading the Clinical Communiqué

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2016-014064.R1
Article Type:	Research
Date Submitted by the Author:	24-Jan-2017
Complete List of Authors:	Cunningham, Nicola; Monash University, Department of Forensic Medicine Pham, Tony; Monash University, Department of Forensic Medicine Kennedy, Briohny; Monash University, Department of Forensic Medicine Gillard, Alexander; Monash University, Department of Forensic Medicine Ibrahim, Joseph E.; Monash University, Department of Forensic Medicine
Primary Subject Heading:	Medical education and training
Secondary Subject Heading:	Legal and forensic medicine
Keywords:	Coroners, Practice change, Printed educational material, patient safety, narrative case reports, death prevention

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A cross-sectional survey using electronic distribution of a questionnaire to subscribers of educational material written by clinicians, for clinicians, to evaluate whether practice change resulted from reading the Clinical Communiqué

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Word count: 2755

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Abstract

Objective: To explore whether subscribers reported clinical practice changes as a result of reading the Clinical Communiqué (CC). Secondarily, to compare the characteristics of subscribers who self-reported changes to clinical practice with those who did not, and to explore subscribers' perceptions of the educational value of the CC.

Design, setting and participants: Online cross-sectional survey between 21st July 2015 to 18th August 2015 by subscribers of the CC (response rate=44.2%).

Main outcome measures: Change in clinical practice as a result of reading the CC.

Results: 53.0% of respondents reported that their practice had changed after reading the CC. Respondents also found that the CC raised awareness (96.5%) and provided ideas about improving patient safety and care (94.1%) leading them to discuss cases with their colleagues (79.6%) and review their practice (75.7%). Multivariate analysis indicated that working in a residential aged care facility and having taken part in an inquest, were significantly associated with practice change.

Conclusion: The design and content of the CC has generated a positive impact on the healthcare community. It is presented in a format that appears to be accessible and acceptable to readers and achieves its goals of promoting safer clinical care through greater awareness of the medico-legal context of practice.

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Strengths and limitations of this study

- This study evaluates the effect that the Clinical Communiqué (CC) has on its readers in terms of practice change
- There was a substantial number of respondents with over 1000 subscribers participating in the survey
- The response rate is double (44%) that which is usually obtained in online surveys (20%)
- The self-reported change to practice of 53.0% is likely an overestimate, however, there is substantive corroboration with 109 subscribers (13%) agreeing 'that if CC was not available, change would not have occurred'
- A control group was not used in our study

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Introduction

Throughout the developed world, it has been estimated that about 10% of hospital admissions are associated with an adverse event.[1] The examination of adverse events in healthcare settings is a tool whereby practical information can be generated to stimulate incentives for change at many levels. However, clinical behaviour is notoriously resistant to change.[2] At an individual level, barriers to (and incentives for) change include: awareness, knowledge, attitude, motivation, and behavioural routines.[3] Systemic organisational factors include change fatigue, resource limitations, restructuring and workplace culture.[4]

Adverse events and patient harm in healthcare settings occur through errors of commission or errors of omission. Errors of commission often manifest as single high-profile catastrophic events, whereas, errors of omission may be more pervasive and difficult to identify.[5] The latter often require careful evaluation to reveal the interplay between remote or unseen factors that may have led to the errors.

In the pursuit of improving patient safety, medico-legal death investigations in healthcare settings can allow for identification of areas suitable for change. Inquests provide a forum within which a coroner conducts a detailed analysis of events that contributed to a patient's death. Errors are explored and questions of 'why', 'what', 'where', and 'who' in relation to practice change can be addressed in the coroner's comments and recommendations. Accessibility of this information to healthcare professionals may be limited by the legal format and technical language of coronial findings. The Clinical Communiqué (CC) is an electronic educational publication that encourages practice reflection and change by providing coronial information regarding preventable deaths in acute hospital and community settings. In order to

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optimize the impact and dissemination of this important information, a relevant clinical context is combined with accessible language and up-to-date expertise (Box 1). The CC contains narrative case reports about lessons learned from coroners' investigations and its target audience is healthcare professionals, clinicians and managers.[6]

Aim

The primary aim of this study was to explore whether subscribers reported clinical practice changes as a result of reading the CC. It also compared the characteristics of subscribers who self-reported changes to clinical practice with those who did not, and explores subscribers' perceptions of the educational value of the CC.

Method

Study Design and Setting

A population-based cross-sectional study was conducted, using an anonymous electronic survey distributed to all registered subscribers of the Clinical Communiqué (CC). A team from the Monash University conducted the survey from July to September in 2015.

Survey Instrument

The survey instrument was refined from previous studies to address the study objectives.[9-11] This involved the refinement of the questionnaire through the changing of phrasing, the addition of new questions and the modification of previous questions by researchers with extensive knowledge of the health care system to make clear the premise of each item within the questionnaire. The questionnaire was then piloted with ten health professionals (five

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nurses and five doctors) and after reviewing the feedback, the survey was further refined. The final questionnaire was designed and distributed through the web-based application Survey Monkey.

The questionnaire consisted of 33 questions divided into three sections: respondent reading behaviour and evaluation of the CC (10 questions); the impact of the CC, including details of practice change (13 questions); and respondent characteristics (10 questions). A change in practice required the respondent to identify the following elements: location (e.g. inpatient ward), discipline involved (e.g. medical staff), nature (e.g. education, policy, clinical care), edition of the CC that influenced change, impact on subject (e.g. patient, staff), and action taken (e.g. new initiative). The survey instrument consisted of closed-ended questions, of which six allowed respondents the opportunity to provide further detail if the 'other' option was selected from the multiple choices. The closed-ended questions were multiple choice, categorical, dichotomous, and Likert-type questions with 5 point rating scales.

Only respondents who reported changing practice after reading the CC were able to answer questions about changes in professional practice. No identifying data was collected.

Study Population

The survey was sent out via email by study investigator through the MailChimp service to all registered subscribers of the CC at the time the study was conducted, and for whom an email address was available. A modified Dillman protocol[12] was used to guide subscriber participation. Subscribers were contacted directly via email and asked to respond to the survey on 21 July, 2015. Two weeks later, a follow-up reminder email was sent to subscribers and a final reminder email was sent after a further two weeks. Respondent anonymity was

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maintained and the researchers blinded by using the web-based survey tool for collection and collation of data. The electronic system automatically identified the non-responders and reminder notices were only sent to subscribers who had not responded to the previous email(s). The Survey Monkey settings were set to refuse multiple responses from the same IP address.

Data Analysis

Survey responses were analysed using Statistical Package for the Social Sciences (SPSS) version 20.0 (SPSS, Inc., Chicago, IL). Descriptive statistics were used to summarise information about respondents' reading behaviour and preferences, the impact of the CC, the nature of self-reported changes to practice and characteristics of the respondents.

Responses to questions answered along an ordinal 5-point Likert-scale were reported using the median and interquartile range, and dichotomised: "yes" consisted of 5 (strongly agree) and 4 (agree), whereas "no" consisted of 3 (neutral), 2 (disagree) and 1 (strongly disagree). The ordinal data was collapsed into dichotomous groups as a conservative approach to the analysis using non-parametric tests. Missing data was analysed using pairwise deletion.

Cronbach's alphas were used to estimate the internal reliability of items relating to respondent opinion about CC content (6 items) and influence on professional practice change (4 items). Cronbach's alphas were estimated using the entire sample of participants.

Bivariate analysis was used to compare the characteristics of respondents who self-reported change in practice with those who did not. Characteristics including respondents' age, gender, professional role, years of experience, frequency of client interaction, practice setting, contact with the Coroners Court and reading behaviour, were analysed using the chi-square test.

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Multivariate logistic regression was used to analyse factors associated with readers who reported change in practice compared to those who did not. Factors were included in the regression analysis if $p<0.25$ in bivariate analysis[13] or were thought to be important based on expert opinion of senior clinical medical and nursing staff with over 10 years' experience in medico-legal death investigations. Reference categories were selected based on the category with the largest number of people as this would be the most robust denominator. Collinearities were identified using a pairwise correlations matrix with $r>0.40$ interpreted as evidence of collinearity.

Ethics Approval

Institutional ethics approval for this study to proceed was granted from the Victorian Institute of Forensic Medicine Research Advisory and Ethics Committee. Implicit consent for the project was considered when the study participants completed the survey.

Results

Of the 3,385 listed subscribers, 3,373 had valid email addresses. Of these, an estimated 2,283 subscribers opened the email containing the questionnaire. A subsequent 1,008 individuals completed the survey giving a response rate of 44.2% (1,008/2,283). All respondents provided valid responses. Cronbach's alphas demonstrated good internal consistency for opinion about CC content (0.93) and influence on practice change (0.87).

Respondent demographic and occupational characteristics

The demographics of the respondents are shown in Table 1. Of the 1008 respondents, most were at or over the age of 45, the majority had worked for over 10 years, and there were more

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females than males. The most commonly identified roles were medical practitioner or nurse. A large proportion worked in clinical roles in Victorian hospitals.

Respondent reading behaviour and preferences

The majority of respondents reported reading all or almost all of each CC issue and approximately half had read all four issues of the CC. Most read the CC as soon as it arrived, and a large proportion used it as a teaching aid. The section most often read was the case summaries (Table 1).

Respondent evaluation of the CC

Table 2 shows the respondents' opinions on the content and efficacy of the CC. A large majority agreed that the content of the CC was useful, reliable, timely, easy to understand, and written in plain language. Respondents also found that the CC raised awareness and provided ideas about improving patient safety and care, leading them to discuss cases with their colleagues and review their practice. The case summaries and expert commentary sections were found to be the most useful in aiding the respondents to improve patient care. The length of the CC was regarded as *'just right'* by most of the respondents, and almost all '*would recommend the CC to their colleagues'* (Table 2).

Nature and significance of self-reported change to practice

496 (53.0%, 496/936) respondents reported that their practice had changed after reading the CC. Details regarding the nature of practice change are shown in Table 3. The change involved either individual change in practice, team-based or workplace practice. The majority of change was reported to have occurred in staff, at inpatient wards, or residential aged care facilities,

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with respect to education and training and clinical practice, involving one or two discipline groups.

Approximately one quarter of respondents reported that without the CC, change would not have occurred. A larger proportion agreed that the change would have taken longer and occurred on a smaller scale (Table 3).

Characteristics and factors associated with respondents who reported change

In bivariate analysis, respondents' age, professional role, and workplace location were found to be significantly associated with practice change (Supplementary table 1).

Multivariate analysis indicated that working in a residential aged care facility and having taken part in an inquest, were significantly associated with practice change. Conversely medical practitioners and pharmacists under the age of 35 years, working in workplaces with minimal patient contact (less than 1 day per week) who had only read 2 or less CC issues, were less likely to change their practice. The multivariate logistic regression model had a Pearson's chi-square of 696.7 (d.f.=683, p=0.35) and a c-statistic of 0.72, indicating that it was a good model.

Discussion

This population-based cross-sectional study found the CC prompts readers to initiate change in their professional practice to improve patient safety. With a response rate higher than the predicted average rate of 20-30% for online surveys, and almost double what has been described to meet stringent conditions for response rates when sampling large groups,[14] this study adds to the existing literature on the value of electronic case summaries and commentaries in reaching and influencing the practice of healthcare professionals.

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We are not aware of any other similar publications to CC, apart from our own, that have had a formal evaluation. The impact on changing practice are consistent with our previous studies[9-11] and substantially greater than those reported in a recent Cochrane review[15] which found a small benefit and highlighted significant variability in printed and electronic educational materials' (PEM) impact on practice.

There are many recognised benefits of PEM. The material is an effective and low cost method of raising awareness. The format and layout can be tailored to appeal to a particular audience to inspire behaviour change. PEM is most effective when combined with other methods, such as using the influence of opinion leaders to disseminate information.[16]

The majority of respondents were clinicians who had worked for more than 10 years, suggesting that the CC appeals not only to junior staff in the early phases of their career path, but also to experienced staff in senior roles. The benefits of having a readership that spans all levels of seniority in a healthcare setting, is that change can take place at the frontline, in the day-to-day aspects of patient care, and also at the policy-making end by staff in positions of clinical and organisational leadership.

The reading behaviour of the respondents showed that there was an overwhelmingly positive and immediate response to the release of each CC issue. Many respondents forwarded the CC to their colleagues, or printed and distributed the issue in communal areas, leading to an estimated reach of more than 28,000 people (Box 2). Clearly not all who read the CC will become subscribers, however the scale of opportunity to raise awareness and provide ideas about improving patient safety should not be underestimated. It is the very nature of raising awareness that may impart the greatest benefit in influencing practice change. In this study,

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97.6% (409/419) of respondents who self-reported practice change selected 'raising awareness of an issue' as directly contributing to the change.

Limited information is available from quantitative studies to understand the relationship between education and change in clinical practice. Education provides one-sixth of the reasons for changes in clinical practice, and is involved in one-third of the changes.[17] In this study, 53.0% (496/936) of respondents reported a practice change after reading the CC. More than 90% of respondents reported that the CC provided ideas about improving patient safety and care and 75.7% (715/945) of respondents had reviewed their practice. This compares favourably to an earlier study where just under half (41.6%, 290/697) of responding subscribers changed their practice.[10]

The CC does not provide rigid guidelines. Instead it provides information that is relayed in the classic human narrative form of story-telling. This is non-hierarchical and the lessons are presented in context. Not only is this form of PEM thought-provoking, it stimulates dialogue between colleagues. 62.4% (590/945) of respondents reported using the CC as a teaching aid, suggesting they not only read it for personal interest but find the cases and topics highly relevant to their work, or their work setting, team, or students, and view the material as an appropriate educational resource.

Reading individual cases of patient deaths engenders self-reflection and self-assessment, and encourages healthcare professionals to ask: can this happen to my patient?

An important finding was that a quarter of all respondents (26.0%, 109/419) attributed a practice change solely to reading the CC. Of those that felt a practice change would have

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occurred eventually, the majority acknowledged that the change would have been smaller and taken longer.

The survey questions did not explore the extent to which 'practice change' was conceived. Instead, this study focused on more tangible outcomes such as projects and initiatives as indicators of practice change. Subtle changes such as a change in communication, or simply reflecting on a case during a patient-interaction was not asked about, but could occur on a much more frequent basis and may influence practice in ways that are harder to measure.

The multivariate analysis showed that residential aged care (RAC) staff were more likely to make practice changes. This was an unexpected finding and may have reflected greater familiarity that some RAC staff have with utilisation of the CC, through its sister publication, the Residential Aged Care Communiqué (now in its tenth year of publication), and its potential to facilitate change. The findings that medical practitioners and pharmacists under the age of 35 years and working with minimal patient contact were less likely to change their practice as a result of reading the CC, may suggest that the educational relevance was not as applicable to their working roles and environment. The cases were predominantly set in hospital wards, and the key messages were largely centred around staff tasked with responding to an acutely unwell patient.

A limitation of this study is that subscribers were asked to participate and discuss practice change after only four issues had been released. Clinical guidelines can take up to three years to be fully implemented.[16] There are many challenges to the development of clinical guidelines. Failure to address the key areas of funding, clinical involvement, conflicts of interest, intended

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setting or audience, can all hamper the implementation of guidelines that inform practice change to improve patient care.[18]

Another limitation of this study is that the scope did not allow the investigators to examine in detail the changes that were reported, or whether the practice changes sustained over time. Therefore, quantifying the risk reduction and lives saved is not possible. Pairwise deletion can be a source of bias as there may be a non-random pattern of missing data.[19] Also, control groups were not utilised.

Conclusion

Investigations into patient deaths identify preventable errors and enhance knowledge of the many risks to patients that exist in the healthcare setting. The design and content of the CC has generated a positive impact on the healthcare community. It is presented in a format that appears to be accessible and acceptable to readers and achieves its goals of promoting safer clinical care through greater awareness of the medico-legal context of practice.

Contributors

JEI contributed to conception, design and development of the study, assembly of the survey and revising the manuscript critically for important intellectual content; and as senior author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. **NC** contributed to development of the survey, was involved in drafting the manuscript and revising it critically for

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important intellectual content. **TP** performed the statistical analysis was involved in drafting the manuscript and revising it critically for important intellectual content. **BK** contributed to development of the study, was involved in revising the manuscript critically for important intellectual content. **AG** contributed to development, distribution, monitoring and collation of the survey. All authors read and approved the final manuscript.

Funding

The Victorian Managed Insurance Authority (VMIA) funded this study.

Competing interests

JEI and NC are directly involved in the production of the "Clinical Communiqué". Otherwise the authors have no competing interests.

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Boxes and Tables

Box 1.

History of the Clinical Communiqué

The CC was launched in September 2014 as a revamped version of the Coronial Communiqué. Established in 2003, the Coronial Communiqué represented the first serial electronic publication of narrative case reports about clinical lessons learned from patient deaths investigated by the Victorian Coroner's Office.[7] Twenty-one editions were released before it went into a hiatus in 2009 due to resource constraints. In its current form, the CC is published quarterly and uses coronial cases from local, interstate, and international jurisdictions to explore the challenges that clinicians face every day in providing clinical care. Each issue identifies key themes that are vital to improving patient safety such as communication, supervision, decision-making, and recognising the deteriorating patient. Many of the themes are reflected in the National Safety and Quality Health Service Standards.[8] These are presented as case summaries and expert commentaries.

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Table 1. Demographic and occupational characteristics and respondent reading behaviour (N=1008)

Demographic and occupational characteristics		n	%
Age (years)[a]			
	≤34	101	11.6
	35-44	196	22.5
	45-54	308	35.3
	≥55	268	30.7
Gender[a]			
	Female	643	73.7
	Male	230	26.3
Professional Role[a]			
	Allied Health Professional	25	2.9
	Medical Practitioner	240	27.5
	Nurse	277	31.7
	Paramedic	24	2.7
	Pharmacist	35	4.0
	Quality and Risk Manager	99	11.3
	Other	173	19.8
Experience in profession (years)[a]			
	≤5	183	21.0
	6-10	130	14.9
	11-15	115	13.2
	16-20	86	9.9
	≥21	359	41.1
Workplace setting[a]			
	Government Department/Agency	41	4.7
	Hospital – Acute	451	51.7
	Hospital – Subacute	47	5.4
	Primary Care	72	8.2
	Residential Aged Care Service	109	12.5
	University or Other Academic	32	3.7
	Other	121	13.9
State or country[a]			
	Victoria	549	62.9
	Other State or Territory of Australia	313	35.9
	Other Country	11	1.3

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Frequency of patient interaction per week (days)[a]		
Less than one	230	26.3
One	58	6.6
Two or three	107	12.3
Four or more	478	54.8
Level of contact with Coroners Court[a]		
Taken part in an inquest	148	17.0
Provided a statement	207	23.7
Contacted Court to discuss if death was reportable	338	38.7
Contacted Court for other reasons	289	33.1
No contact	299	34.2
Respondent Reading Behaviour and Preferences	**n**	**%**
Respondent reading behaviour		
Read all 4 issues[b]	466	47.1
Read all or almost all of each issue[c]	747	79.0
Respondents regularly read the following sections[d,e]		
Case summaries	927	99.3
Expert commentary	916	98.0
Editorial	821	88.1
Resources list	525	56.6
Use of the Clinical Communiqué[c,e]		
I read it as soon as it arrives	802	84.9
I encourage my colleagues to read it	681	72.1
I refer to it in my job	407	43.1
I use it as a teaching aid	590	62.4
Number of people with access to the Clinical Communiqué[c,f]		
Only myself	441	46.7
One other person	53	5.6
3 to 5 other people	124	13.1
6 to 10 other people	85	9.0
11 to 20 other people	73	7.7
21 to 30 other people	62	6.6
More than 31 other people	107	11.3

[a]135 respondents failed to answer this question and were not included in the analysis (N=873)

[b]19 respondents failed to answer this question and were not included in the analysis (N=989)

[c]63 respondents failed to answer this question and were not included in the analysis

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(N=945)

[d]The number of respondents varies for this question (N=934, 935, 932, 928) respectively

[e]Five-point Likert scale, 5=strongly agree to 1=strongly disagree. Positive responses are counted as the sum of responses that stated 'strongly agree' and 'agree'

[f]The reach of the CC was calculated from these results. The lower (28,575) and upper ranges (30,958) were determined by multiplying the number of respondents with the extremes of their response. Respondents who answered 'more than 31 other people' to this question were given an option to provide the actual number and where available, this response was used in the calculation

NB. Because of rounding not all percentages cumulatively sum to 100

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Table 2. Respondent Evaluation Criteria (N=1008)

Respondent Evaluation Criteria	n	%	Median (25th-75th percentile)
Information given in the Clinical Communiqué is:[a,c]			
Useful	928	99.1	5 (4-5)
Reliable	907	96.9	5 (4-5)
Timely	728	77.8	4 (4-5)
Easy to understand	912	97.4	5 (4-5)
Written in plain language	917	98.0	5 (4-5)
The following sections of the Clinical Communiqué are useful for improving patient care:[a,c]			
Case summaries	922	98.5	5 (4-5)
Expert commentary	914	97.6	5 (4-5)
Editorial	799	85.4	4 (4-5)
Resources list	628	67.1	4 (3-4)
Reading the Clinical Communiqué[b,c]			
Raised awareness about improving patient safety and clinical care	912	96.5	5 (4-5)
Provided ideas for improving safety and clinical care	889	94.1	4 (4-5)
Prompted me to discuss cases with colleagues	752	79.6	4 (4-5)
Prompted me to review my practice	715	75.7	4 (4-4)
The length of the Clinical Communiqué is just right[a]	766	81.8	–
I would recommend the Clinical Communiqué to my colleagues[a,d]	927	99.0	5 (5-5)

[a]72 respondents failed to answer this question and were excluded from analysis (N=936)
[b]63 respondents failed to answer this question and were excluded from analysis (N=945)
[c]Five-point Likert scale, 5=strongly agree to 1=strongly disagree. Positive responses are counted as the sum of responses that stated 'strongly agree' and 'agree'
[d]Five-point Likert scale, 5 = definitely yes to 1 = definitely not. Positive responses are counted as the sum of responses that stated 'definitely yes' and 'probably yes'

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Table 3. Details of self-reported change to practice (N=496)

Characteristics of practice change	n	%
Workplace[a]		
Emergency department	89	21.2
Intensive care unit	42	10.0
Operating theatre	51	12.2
Inpatient ward	146	34.8
Outpatient unit primary care	47	11.2
Residential aged care facility	119	28.4
Other	92	22.0
Who was involved in the practice change?[a]		
One discipline group (e.g. doctors only)	157	37.5
Two discipline groups (e.g. doctors and nurses)	188	44.9
Three discipline groups (e.g. doctors, nurses and pharmacists)	48	11.5
Four or more discipline groups	38	9.1
Practice change was related to[a]		
Education and training	286	68.3
Policy, procedures and protocols	182	43.4
Clinical practice	283	67.5
Evaluation of care	142	33.9
Documentation of practice	205	48.9
Improving staff morale/attitude	122	29.1
Environment/equipment	65	15.5
Edition of the Clinical Communiqué which influenced practice change[a]		
'Communiqué cases and the National Health Service Standards'	124	29.6
'Recognising early warning signs of the deteriorating patient'	341	81.4
'Communication and decision making at the bedside'	253	60.4
'Responding as a team to medical emergency'	191	45.6
The practice change had an impact on[a]		
Patient care	339	80.9
Staff	380	90.7
Environment	215	51.3
Organisation	268	64.0
The action taken in the practice change was to[a]		
Introduce a new initiative	71	16.9
Alter or modify an existing initiative	382	91.2
Discontinue an existing initiative	24	5.7

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Number of initiatives where the Clinical Communiqué was used to change practice[a]		
One	151	36.0
Two	175	41.8
Three	63	15.0
Four	12	2.9
Five or more	19	4.5
Degree to which the Clinical Communiqué influenced practice change[a,b]		
Selecting area of improvement	306	73.0
Defining the scope of the project	173	41.3
Engaging senior management	189	45.1
Engaging point of care staff	276	65.9
Identifying required resources	203	48.5
Setting project timelines	76	18.1
Gathering background research/analysis	227	54.2
The Clinical Communiqué influenced practice change[a,c]		
By raising awareness of an issue	409	97.6
By engaging staff	354	84.5
Because of the authority of the publication	310	74.0
By suggesting improvement strategies	359	85.7
By prompting staff to evaluate their existing practice	369	88.1
If the Clinical Communiqué had not been available, the change would have[a,c]		
Happened anyway	129	30.8
Taken longer	347	82.8
Happened on a smaller scale	236	56.3
Not occurred	109	26.0

[a]77 respondents failed to answer this question and were excluded from analysis (N=419)
[b]Five-point Likert scale, 5=strongly agree to 1=strongly disagree. Positive responses are counted as the sum of responses that stated 'strongly agree' and 'agree'
[c]Five-point Likert scale, 5=extremely influential to 1=not at all influential. Positive responses are counted as the sum of responses that stated 'extremely influential' and 'very influential'

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Box 2.

Reach of the Clinical Communiqué

As the CC is delivered via email, it is difficult to determine exactly how many people are being exposed to the contents of the CC. Therefore by asking respondents how many people have access to the CC at their workplace, it was calculated that for this sample of 1,008 respondents, the CC reached between 28,575 and 30,958 people. Therefore, each person on average, shared the CC with at least 9 other people.

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Characteristic	Changed practice n	Changed practice %	Did not change practice n	Did not change practice %	Multivariate odds ratio (95% confidence interval)	Chi-Square	p-value (bivariate)
Age (years)[a]							
45-54	160	52.8	143	47.2	1.00		
<35	29	29.0	71	71.0	0.45 (0.27-0.77)*		
35-44	110	57.3	82	42.7	1.48 (0.99-2.22)		
>54	118	45.0	144	55.0	0.72 (0.50-1.04)	24.36	<0.01
Gender[a]							
Female	316	44.3	313	55.7	1.00		
Male	101	44.3	127	49.8	0.80 (0.55-1.17)	2.36	0.12
Professional role[a]							
Nurse	155	57.4	115	42.6	1.00		
Allied health	24	50.0	24	50.0	1.28 (0.63-2.62)		
Medical practitioner	95	40.4	140	59.6	0.49 (0.31-0.77)*		
Pharmacist	5	14.3	30	85.7	0.15 (0.05-0.40)*		
Quality and risk manager	55	56.1	43	43.9	1.07 (0.61-1.87)		
Other	83	48.5	88	51.5	1.03 (0.65-1.64)	33.42	<0.01
Years of experience[a]							
<6	81	45.0	99	55.0			
6-10	54	41.5	76	58.5			
11-15	50	44.6	62	55.4			
16-20	51	68.0	24	32.0			
>20	181	51.7	169	48.3	†	10.01	0.04
Workplace location[a]							
Hospital	238	48.4	254	51.6	1.00		
Government department	16	39.0	25	61.0	0.81 (0.38-1.72)		
Primary care	36	52.2	33	47.8	1.18 (0.68-2.02)		
Residential aged care service	75	70.1	32	29.9	1.95 (1.18-3.24)*		
Other	52	35.1	96	64.9	0.48 (0.31-0.75)*	32.39	<0.01
Frequency of patient contact (times per week)[a]							
Four or more	240	51.2	229	48.8	1.00		
Less than one	92	40.7	134	59.3	0.51 (0.33-0.81)*		
One	32	56.1	25	43.9	1.03 (0.54-1.95)		
Two or three	53	50.5	52	49.5	0.83 (0.52-1.33)	8.32	0.04

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Level of contact with the Coroners Court[a]							
Has not taken part in an inquest	331	46.6	380	53.4	1.00		
Taken part in an inquest	86	58.9	60	41.1	1.92 (1.24-2.98)*	7.40	<0.01
Has not provided a statement	315	48.3	337	51.7			
Provided a statement	102	49.8	103	50.2	‡	0.13	0.72
Has not contacted court to discuss if death was reportable	243	46.5	280	53.5	1.00		
Contacted court to discuss if death was reportable	174	52.1	160	47.9	1.15 (0.77-1.70)	2.59	0.11
Has not contacted court for other reasons	258	45.3	312	54.7	1.00		
Contacted court for other reasons	159	55.4	128	44.6	1.33 (0.93-1.91)	7.85	<0.01
Has had some form of contact with the Coroners Court	292	51.5	275	48.5	1.00		
No contact with the Coroners Court	125	43.1	165	56.9	0.97 (0.65-1.47)	5.41	0.02
Number of editions read[b]							
All (4)	270	59.0	188	41.0	1.00		
Some (1 or 2)	63	41.4	89	58.6	0.52 (0.34-0.81)*		
At least half (2 or 3)	163	50.0	163	50.0	0.70 (0.53-1.02)	15.84	<0.01
Amount of an issue read (pages)[c]							
All or almost all (4-6)	418	56.5	322	43.5	1.00		
Less than half (<3)	18	39.1	28	60.9	0.71 (0.33-1.52)		
Half (3)	60	40.0	90	60.0	0.71 (0.47-1.07)	17.34	<0.01

[a]135 respondents failed to answer this question and were not included in the analysis (N=873)
[b]19 respondents failed to answer this question and were not included in the analysis. 16 respondents had not read any editions and were unable to answer the question about practice change (N=973)
[c]63 respondents failed to answer this question and were not included in the analysis (N=945)
p<0.05*
‡Variable dropped as p>0.25
†Variable dropped due to collinearity with age (r=0.41)

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STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	**Comment [TP1]:** Completed.
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	**Comment [TP2]:** Completed.
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	**Comment [TP3]:** Completed.
Objectives	3	State specific objectives, including any prespecified hypotheses	**Comment [TP4]:** Completed.
Methods			
Study design	4	Present key elements of study design early in the paper	**Comment [TP5]:** Completed.
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	**Comment [TP6]:** Completed.
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	**Comment [TP7]:** Completed.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	**Comment [TP8]:** Completed.
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	**Comment [TP9]:** Completed.
Bias	9	Describe any efforts to address potential sources of bias	**Comment [TP10]:** Completed.
Study size	10	Explain how the study size was arrived at	**Comment [TP11]:** Completed.
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	**Comment [TP12]:** Completed.
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	**Comment [TP13]:** Completed.
		(*b*) Describe any methods used to examine subgroups and interactions	
		(*c*) Explain how missing data were addressed	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	**Comment [TP14]:** Completed.
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	**Comment [TP15]:** Completed.
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	**Comment [TP16]:** Completed
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	**Comment [TP17]:** Completed
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for	

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		a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	**Comment [TP18]:** Completed.
Discussion			
Key results	18	Summarise key results with reference to study objectives	**Comment [TP19]:** Completed.
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	**Comment [TP20]:** Completed.
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	**Comment [TP21]:** Completed
Generalisability	21	Discuss the generalisability (external validity) of the study results	**Comment [TP22]:** Completed.
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	**Comment [TP23]:** Completed.

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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BMJ Open

A cross-sectional survey using electronic distribution of a questionnaire to subscribers of educational material written by clinicians, for clinicians, to evaluate whether practice change resulted from reading the Clinical Communiqué

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2016-014064.R2
Article Type:	Research
Date Submitted by the Author:	14-Mar-2017
Complete List of Authors:	Cunningham, Nicola; Monash University, Department of Forensic Medicine Pham, Tony; Monash University, Department of Forensic Medicine Kennedy, Briohny; Monash University, Department of Forensic Medicine Gillard, Alexander; Monash University, Department of Forensic Medicine Ibrahim, Joseph E.; Monash University, Department of Forensic Medicine
Primary Subject Heading:	Medical education and training
Secondary Subject Heading:	Legal and forensic medicine
Keywords:	Coroners, Practice change, Printed educational material, patient safety, narrative case reports, death prevention

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A cross-sectional survey using electronic distribution of a questionnaire to subscribers of educational material written by clinicians, for clinicians, to evaluate whether practice change resulted from reading the Clinical Communiqué

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Word count: 2896

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Abstract

Objective: To explore whether subscribers reported clinical practice changes as a result of reading the Clinical Communiqué (CC). Secondarily, to compare the characteristics of subscribers who self-reported changes to clinical practice with those who did not, and to explore subscribers' perceptions of the educational value of the CC.

Design, setting and participants: Online cross-sectional survey between 21st July 2015 to 18th August 2015 by subscribers of the CC (response rate=30.0%, 1,008/3,373), conducted by a team from Monash University, Australia.

Main outcome measures: Change in clinical practice as a result of reading the CC.

Results: 53.0% of respondents reported that their practice had changed after reading the CC. Respondents also found that the CC raised awareness (96.5%) and provided ideas about improving patient safety and care (94.1%) leading them to discuss cases with their colleagues (79.6%) and review their practice (75.7%). Multivariate analysis indicated that working in a residential aged care facility ($p<0.05$) and having taken part in an inquest ($p<0.05$), were significantly associated with practice change.

Conclusion: The design and content of the CC has generated a positive impact on the healthcare community. It is presented in a format that appears to be accessible and acceptable to readers and achieves its goals of promoting safer clinical care through greater awareness of the medico-legal context of practice.

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Strengths and limitations of this study

- This study evaluates the effect that the Clinical Communiqué (CC) has on its readers in terms of practice change
- There was a substantial number of respondents with over 1000 subscribers participating in the survey
- The response rate (30%) is higher than that which is usually obtained in online surveys (20%)
- The self-reported change to practice of 53.0% is likely an overestimate, however, there is substantive corroboration with 109 subscribers (13%) agreeing 'that if CC was not available, change would not have occurred'
- A control group was not used in our study

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Introduction

Throughout the developed world, it has been estimated that about 10% of hospital admissions are associated with an adverse event.[1] The examination of adverse events in healthcare settings is a tool whereby practical information can be generated to stimulate incentives for change at many levels. However, clinical behaviour is notoriously resistant to change.[2] At an individual level, barriers to (and incentives for) change include: awareness, knowledge, attitude, motivation, and behavioural routines.[3] Systemic organisational factors include change fatigue, resource limitations, restructuring and workplace culture.[4]

Adverse events and patient harm in healthcare settings occur through errors of commission or errors of omission. Errors of commission often manifest as single high-profile catastrophic events, whereas, errors of omission may be more pervasive and difficult to identify.[5] The latter often require careful evaluation to reveal the interplay between remote or unseen factors that may have led to the errors.

In the pursuit of improving patient safety, medico-legal death investigations in healthcare settings can allow for identification of areas suitable for change. Inquests provide a forum within which a coroner conducts a detailed analysis of events that contributed to a patient's death. Errors are explored and questions of 'why', 'what', 'where', and 'who' in relation to practice change can be addressed in the coroner's comments and recommendations. Accessibility of this information to healthcare professionals may be limited by the legal format and technical language of coronial findings. The Clinical Communiqué (CC) is an electronic educational publication that encourages practice reflection and change by providing coronial information regarding preventable deaths in acute hospital and community settings. In order to

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optimize the impact and dissemination of this important information, a relevant clinical context is combined with accessible language and up-to-date expertise (Box 1). The CC contains narrative case reports about lessons learned from coroners' investigations and its target audience is healthcare professionals, clinicians and managers.[6]

Aim

The primary aim of this study was to explore whether subscribers reported clinical practice changes as a result of reading the CC. It also compared the characteristics of subscribers who self-reported changes to clinical practice with those who did not, and explores subscribers' perceptions of the educational value of the CC.

Method

Study Design and Setting

A population-based cross-sectional study was conducted, using an anonymous electronic survey distributed to all registered subscribers of the Clinical Communiqué (CC). A team from the Monash University, Australia, conducted the survey from July to September in 2015.

Survey Instrument

The survey instrument was refined from previous studies to address the study objectives.[9-11] This involved the refinement of the questionnaire through the changing of phrasing, the addition of new questions and the modification of previous questions by researchers with extensive knowledge of the health care system to make clear the premise of each item within the questionnaire. The questionnaire was then piloted with ten health professionals (five

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nurses and five doctors) and after reviewing the feedback, the survey was further refined. The final questionnaire was designed and distributed through the web-based application Survey Monkey.

The questionnaire consisted of 33 questions divided into three sections: respondent reading behaviour and evaluation of the CC (10 questions); the impact of the CC, including details of practice change (13 questions); and respondent characteristics (10 questions). A change in practice required the respondent to identify the following elements: location (e.g. inpatient ward), discipline involved (e.g. medical staff), nature (e.g. education, policy, clinical care), edition of the CC that influenced change, impact on subject (e.g. patient, staff), and action taken (e.g. new initiative). The survey instrument consisted of closed-ended questions, of which six allowed respondents the opportunity to provide further detail if the 'other' option was selected from the multiple choices. The closed-ended questions were multiple choice, categorical, dichotomous, and Likert-type questions with 5 point rating scales.

Only respondents who reported changing practice after reading the CC were able to answer questions about changes in professional practice. No identifying data was collected.

Study Population

The survey was sent out via email by study investigator through the MailChimp service to all registered subscribers of the CC at the time the study was conducted, and for whom an email address was available. A modified Dillman protocol[12] was used to guide subscriber participation. Subscribers were contacted directly via email and asked to respond to the survey on 21 July, 2015. Two weeks later, a follow-up reminder email was sent to subscribers and a final reminder email was sent after a further two weeks. Respondent anonymity was

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maintained and the researchers blinded by using the web-based survey tool for collection and collation of data. The electronic system automatically identified the non-responders and reminder notices were only sent to subscribers who had not responded to the previous email(s). The Survey Monkey settings were set to refuse multiple responses from the same IP address.

Data Analysis

Survey responses were analysed using Statistical Package for the Social Sciences (SPSS) version 20.0 (SPSS, Inc., Chicago, IL). Descriptive statistics were used to summarise information about respondents' reading behaviour and preferences, the impact of the CC, the nature of self-reported changes to practice and characteristics of the respondents.

Responses to questions answered along an ordinal 5-point Likert-scale were reported using the median and interquartile range, and dichotomised: "yes" consisted of 5 (strongly agree) and 4 (agree), whereas "no" consisted of 3 (neutral), 2 (disagree) and 1 (strongly disagree). The ordinal data was collapsed into dichotomous groups as a conservative approach to the analysis using non-parametric tests. Missing data was analysed using pairwise deletion.

Cronbach's alphas were used to estimate the internal reliability of items relating to respondent opinion about CC content (6 items) and influence on professional practice change (4 items). Cronbach's alphas were estimated using the entire sample of participants.

Bivariate analysis was used to compare the characteristics of respondents who self-reported change in practice with those who did not. Characteristics including respondents' age, gender, professional role, years of experience, frequency of client interaction, practice setting, contact with the Coroners Court and reading behaviour, were analysed using the chi-square test.

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Multivariate logistic regression was used to analyse factors associated with readers who reported change in practice compared to those who did not. Factors were included in the regression analysis if $p<0.25$ in bivariate analysis[13] or were thought to be important based on expert opinion of senior clinical medical and nursing staff with over 10 years' experience in medico-legal death investigations. Reference categories were selected based on the category with the largest number of people as this would be the most robust denominator. Collinearities were identified using a pairwise correlations matrix with $r>0.40$ interpreted as evidence of collinearity.

Non-response bias was analysed by comparing demographical data of survey respondents with that of the 'register to subscribe' database of the CC. Since all subscribers were surveyed, differences between the two groups were used to derive non-respondent data. Non-respondent and respondent demographics (gender, age, professional role) were analysed by comparing proportions.

Ethics Approval

Institutional ethics approval for this study to proceed was granted from the Victorian Institute of Forensic Medicine Research Advisory and Ethics Committee. Implicit consent for the project was considered when the study participants completed the survey.

Results

Of the 3,385 listed subscribers, 3,373 had valid email addresses. 1,008 individuals completed the survey giving a response rate of 30.0% (1,008/3,373). All respondents provided valid

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responses. Cronbach's alphas demonstrated good internal consistency for opinion about CC content (0.93) and influence on practice change (0.87).

Respondent demographic and occupational characteristics

The demographics of the respondents are shown in Table 1. Of the 1,008 respondents, most were at or over the age of 45, the majority had worked for over 10 years, and there were more females than males. The most commonly identified roles were medical practitioner or nurse. A large proportion worked in clinical roles in Victorian hospitals.

Respondent reading behaviour and preferences

The majority of respondents reported reading all or almost all of each CC issue and approximately half had read all four issues of the CC. Most read the CC as soon as it arrived, and a large proportion used it as a teaching aid. The section most often read was the case summaries (Table 1).

Respondent evaluation of the CC

Table 2 shows the respondents' opinions on the content and efficacy of the CC. A large majority agreed that the content of the CC was useful, reliable, timely, easy to understand, and written in plain language. Respondents also found that the CC raised awareness and provided ideas about improving patient safety and care, leading them to discuss cases with their colleagues and review their practice. The case summaries and expert commentary sections were found to be the most useful in aiding the respondents to improve patient care. The length of the CC was regarded as *'just right'* by most of the respondents, and almost all '*would recommend the CC to their colleagues'* (Table 2).

Nature and significance of self-reported change to practice

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496 (53.0%, 496/936) respondents reported that their practice had changed after reading the CC. Details regarding the nature of practice change are shown in Table 3. The change involved either individual change in practice, team-based or workplace practice. The majority of change was reported to have occurred in staff, at inpatient wards, or residential aged care facilities, with respect to education and training and clinical practice, involving one or two discipline groups.

Approximately one quarter of respondents reported that without the CC, change would not have occurred. A larger proportion agreed that the change would have taken longer and occurred on a smaller scale (Table 3).

Characteristics and factors associated with respondents who reported change

In bivariate analysis, respondents' age, professional role, and workplace location were found to be significantly associated with practice change ($p<0.05$) (Supplementary table 1).

Multivariate analysis indicated that working in a residential aged care facility and having taken part in an inquest, were significantly associated with practice change ($p<0.05$). Conversely medical practitioners and pharmacists under the age of 35 years, working in workplaces with minimal patient contact (less than 1 day per week) who had only read 2 or less CC issues, were less likely to change their practice ($p<0.05$). The multivariate logistic regression model had a Pearson's chi-square of 696.7 (d.f.=683, p=0.35) and a c-statistic of 0.72, indicating that it was a good model (c-statistic between 0.70 and 0.80).[13]

Discussion

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This population-based cross-sectional study found the CC prompts readers to initiate change in their professional practice to improve patient safety. With a response rate at the higher end of the predicted average rate of 20-30% for online surveys, and higher than what has been described to meet stringent conditions for response rates when sampling large groups,[14] this study adds to the existing literature[9-11,15] on the value of electronic case summaries and commentaries in reaching and influencing the practice of healthcare professionals.

We are not aware of any other similar publications to the CC, apart from our own, that have had a formal evaluation. The impact on changing practice are consistent with our previous studies[9-11] and substantially greater than those reported in a recent Cochrane review[15] which found a small benefit and highlighted significant variability in printed and electronic educational materials' (PEM) impact on practice.

There are many recognised benefits of PEM. The material is an effective and low cost method of raising awareness. The format and layout can be tailored to appeal to a particular audience to inspire behaviour change. PEM is most effective when combined with other methods, such as using the influence of opinion leaders to disseminate information.[16]

The majority of respondents were clinicians who had worked for more than 10 years, suggesting that the CC appeals not only to junior staff in the early phases of their career path, but also to experienced staff in senior roles. The benefits of having a readership that spans all levels of seniority in a healthcare setting, is that change can take place at the frontline, in the day-to-day aspects of patient care, and also at the policy-making end by staff in positions of clinical and organisational leadership.

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The reading behaviour of the respondents showed that there was an overwhelmingly positive and immediate response to the release of each CC issue. Many respondents forwarded the CC to their colleagues, or printed and distributed the issue in communal areas, leading to an estimated reach of more than 28,000 people (Box 2). Clearly not all who read the CC will become subscribers, however the scale of opportunity to raise awareness and provide ideas about improving patient safety should not be underestimated. It is the very nature of raising awareness that may impart the greatest benefit in influencing practice change. In this study, 97.6% (409/419) of respondents who self-reported practice change selected 'raising awareness of an issue' as directly contributing to the change.

Limited information is available from quantitative studies to understand the relationship between education and change in clinical practice. Education provides one-sixth of the reasons for changes in clinical practice, and is involved in one-third of the changes.[17] In this study, 53.0% (496/936) of respondents reported a practice change after reading the CC. More than 90% of respondents reported that the CC provided ideas about improving patient safety and care and 75.7% (715/945) of respondents had reviewed their practice. This compares favourably to an earlier study where just under half (41.6%, 290/697) of responding subscribers changed their practice.[10]

The CC does not provide rigid guidelines. Instead it provides information that is relayed in the classic human narrative form of story-telling. This is non-hierarchical and the lessons are presented in context. Not only is this form of PEM thought-provoking, it stimulates dialogue between colleagues. 62.4% (590/945) of respondents reported using the CC as a teaching aid, suggesting they not only read it for personal interest but find the cases and topics highly

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relevant to their work, or their work setting, team, or students, and view the material as an appropriate educational resource.

Reading individual cases of patient deaths engenders self-reflection and self-assessment, and encourages healthcare professionals to ask: can this happen to my patient?

An important finding was that a quarter of all respondents (26.0%, 109/419) attributed a practice change solely to reading the CC. Of those that felt a practice change would have occurred eventually, the majority acknowledged that the change would have been smaller and taken longer.

The survey questions did not explore the extent to which 'practice change' was conceived. Instead, this study focused on more tangible outcomes such as projects and initiatives as indicators of practice change. Subtle changes such as a change in communication, or simply reflecting on a case during a patient-interaction was not asked about, but could occur on a much more frequent basis and may influence practice in ways that are harder to measure.

The multivariate analysis showed that residential aged care (RAC) staff were more likely to make practice changes. This was an unexpected finding and may have reflected greater familiarity that some RAC staff have with utilisation of the CC, through its sister publication, the Residential Aged Care Communiqué (now in its tenth year of publication), and its potential to facilitate change. The findings that medical practitioners and pharmacists under the age of 35 years and working with minimal patient contact were less likely to change their practice as a result of reading the CC, may suggest that the educational relevance was not as applicable to their working roles and environment. The cases were predominantly set in hospital wards, and

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the key messages were largely centred around staff tasked with responding to an acutely unwell patient.

A limitation of this study is that subscribers were asked to participate and discuss practice change after only four issues had been released. Clinical guidelines can take up to three years to be fully implemented.[16] There are many challenges to the development of clinical guidelines. Failure to address the key areas of funding, clinical involvement, conflicts of interest, intended setting or audience, can all hamper the implementation of guidelines that inform practice change to improve patient care.[18]

Another limitation of this study is that the scope did not allow the investigators to examine in detail the changes that were reported, or whether the practice changes sustained over time. Therefore, quantifying the risk reduction and lives saved is not possible.

Furthermore, the response rate (30.0%) leaves potential for non-response bias where non-respondents could have characteristics that differ from survey respondents. Analyses for non-response bias (Supplementary Table 2) reveal that the proportions of survey participants were greater for the older age group (>55 years) and for respondents who identified as quality and risk managers. This is likely to contribute to an overestimate of effect of the impact of PEM. If we assume all non-respondents did not change practice, the estimate of impact is still large at 14.7% of all subscribers (496/3,373).

In addition, pairwise deletion can be a source of bias as there may be a non-random pattern of missing data.[19] Also, control groups were not utilised.

Conclusion

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Investigations into patient deaths identify preventable errors and enhance knowledge of the many risks to patients that exist in the healthcare setting. The design and content of the CC has generated a positive impact on the healthcare community. It is presented in a format that appears to be accessible and acceptable to readers and achieves its goals of promoting safer clinical care through greater awareness of the medico-legal context of practice.

Contributors

JEI contributed to conception, design and development of the study, assembly of the survey and revising the manuscript critically for important intellectual content; and as senior author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. **NC** contributed to development of the survey, was involved in drafting the manuscript and revising it critically for important intellectual content. **TP** performed the statistical analysis was involved in drafting the manuscript and revising it critically for important intellectual content. **BK** contributed to development of the study, was involved in revising the manuscript critically for important intellectual content. **AG** contributed to development, distribution, monitoring and collation of the survey. All authors read and approved the final manuscript.

Funding

The Victorian Managed Insurance Authority (VMIA) funded this study.

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Competing interests

JEI and NC are directly involved in the production of the “Clinical Communiqué”. Otherwise the authors have no competing interests.

Data sharing statement

No additional data available.

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Boxes and Tables

Box 1.

History of the Clinical Communiqué

The CC was launched in September 2014 as a revamped version of the Coronial Communiqué. Established in 2003, the Coronial Communiqué represented the first serial electronic publication of narrative case reports about clinical lessons learned from patient deaths investigated by the Victorian Coroner's Office.[7] Twenty-one editions were released before it went into a hiatus in 2009 due to resource constraints. In its current form, the CC is published quarterly and uses coronial cases from local, interstate, and international jurisdictions to explore the challenges that clinicians face every day in providing clinical care. Each issue identifies key themes that are vital to improving patient safety such as communication, supervision, decision-making, and recognising the deteriorating patient. Many of the themes are reflected in the National Safety and Quality Health Service Standards.[8] These are presented as case summaries and expert commentaries.

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Table 1. Demographic and occupational characteristics and respondent reading behaviour (N=1008)

Demographic and occupational characteristics		n	%
Age (years)[a]			
	≤34	101	11.6
	35-44	196	22.5
	45-54	308	35.3
	≥55	268	30.7
Gender[a]			
	Female	643	73.7
	Male	230	26.3
Professional Role[a]			
	Allied Health Professional	25	2.9
	Medical Practitioner	240	27.5
	Nurse	277	31.7
	Paramedic	24	2.7
	Pharmacist	35	4.0
	Quality and Risk Manager	99	11.3
	Other	173	19.8
Experience in profession (years)[a]			
	≤5	183	21.0
	6-10	130	14.9
	11-15	115	13.2
	16-20	86	9.9
	≥21	359	41.1
Workplace setting[a]			
	Government Department/Agency	41	4.7
	Hospital – Acute	451	51.7
	Hospital – Subacute	47	5.4
	Primary Care	72	8.2
	Residential Aged Care Service	109	12.5
	University or Other Academic	32	3.7
	Other	121	13.9
State or country[a]			
	Victoria	549	62.9
	Other State or Territory of Australia	313	35.9
	Other Country	11	1.3

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Frequency of patient interaction per week (days)[a]		
Less than one	230	26.3
One	58	6.6
Two or three	107	12.3
Four or more	478	54.8
Level of contact with Coroners Court[a]		
Taken part in an inquest	148	17.0
Provided a statement	207	23.7
Contacted Court to discuss if death was reportable	338	38.7
Contacted Court for other reasons	289	33.1
No contact	299	34.2
Respondent Reading Behaviour and Preferences	**n**	**%**
Respondent reading behaviour		
Read all 4 issues[b]	466	47.1
Read all or almost all of each issue[c]	747	79.0
Respondents regularly read the following sections[d,e]		
Case summaries	927	99.3
Expert commentary	916	98.0
Editorial	821	88.1
Resources list	525	56.6
Use of the Clinical Communiqué[c,e]		
I read it as soon as it arrives	802	84.9
I encourage my colleagues to read it	681	72.1
I refer to it in my job	407	43.1
I use it as a teaching aid	590	62.4
Number of people with access to the Clinical Communiqué[c,f]		
Only myself	441	46.7
One other person	53	5.6
3 to 5 other people	124	13.1
6 to 10 other people	85	9.0
11 to 20 other people	73	7.7
21 to 30 other people	62	6.6
More than 31 other people	107	11.3

[a]135 respondents failed to answer this question and were not included in the analysis (N=873)

[b]19 respondents failed to answer this question and were not included in the analysis (N=989)

[c]63 respondents failed to answer this question and were not included in the analysis

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(N=945)

[d]The number of respondents varies for this question (N=934, 935, 932, 928) respectively

[e]Five-point Likert scale, 5=strongly agree to 1=strongly disagree. Positive responses are counted as the sum of responses that stated 'strongly agree' and 'agree'

[f]The reach of the CC was calculated from these results. The lower (28,575) and upper ranges (30,958) were determined by multiplying the number of respondents with the extremes of their response. Respondents who answered 'more than 31 other people' to this question were given an option to provide the actual number and where available, this response was used in the calculation

NB. Because of rounding not all percentages cumulatively sum to 100

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Table 2. Respondent Evaluation Criteria (N=1008)

Respondent Evaluation Criteria	n	%	Median (25th-75th percentile)
Information given in the Clinical Communiqué is:[a,c]			
Useful	928	99.1	5 (4-5)
Reliable	907	96.9	5 (4-5)
Timely	728	77.8	4 (4-5)
Easy to understand	912	97.4	5 (4-5)
Written in plain language	917	98.0	5 (4-5)
The following sections of the Clinical Communiqué are useful for improving patient care:[a,c]			
Case summaries	922	98.5	5 (4-5)
Expert commentary	914	97.6	5 (4-5)
Editorial	799	85.4	4 (4-5)
Resources list	628	67.1	4 (3-4)
Reading the Clinical Communiqué[b,c]			
Raised awareness about improving patient safety and clinical care	912	96.5	5 (4-5)
Provided ideas for improving safety and clinical care	889	94.1	4 (4-5)
Prompted me to discuss cases with colleagues	752	79.6	4 (4-5)
Prompted me to review my practice	715	75.7	4 (4-4)
The length of the Clinical Communiqué is just right[a]	766	81.8	–
I would recommend the Clinical Communiqué to my colleagues[a,d]	927	99.0	5 (5-5)

[a]72 respondents failed to answer this question and were excluded from analysis (N=936)
[b]63 respondents failed to answer this question and were excluded from analysis (N=945)
[c]Five-point Likert scale, 5=strongly agree to 1=strongly disagree. Positive responses are counted as the sum of responses that stated 'strongly agree' and 'agree'
[d]Five-point Likert scale, 5 = definitely yes to 1 = definitely not. Positive responses are counted as the sum of responses that stated 'definitely yes' and 'probably yes'

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Table 3. Details of self-reported change to practice (N=496)

Characteristics of practice change	n	%
Workplace[a]		
Emergency department	89	21.2
Intensive care unit	42	10.0
Operating theatre	51	12.2
Inpatient ward	146	34.8
Outpatient unit primary care	47	11.2
Residential aged care facility	119	28.4
Other	92	22.0
Who was involved in the practice change?[a]		
One discipline group (e.g. doctors only)	157	37.5
Two discipline groups (e.g. doctors and nurses)	188	44.9
Three discipline groups (e.g. doctors, nurses and pharmacists)	48	11.5
Four or more discipline groups	38	9.1
Practice change was related to[a]		
Education and training	286	68.3
Policy, procedures and protocols	182	43.4
Clinical practice	283	67.5
Evaluation of care	142	33.9
Documentation of practice	205	48.9
Improving staff morale/attitude	122	29.1
Environment/equipment	65	15.5
Edition of the Clinical Communiqué which influenced practice change[a]		
'Communiqué cases and the National Health Service Standards'	124	29.6
'Recognising early warning signs of the deteriorating patient'	341	81.4
'Communication and decision making at the bedside'	253	60.4
'Responding as a team to medical emergency'	191	45.6
The practice change had an impact on[a]		
Patient care	339	80.9
Staff	380	90.7
Environment	215	51.3
Organisation	268	64.0
The action taken in the practice change was to[a]		
Introduce a new initiative	71	16.9
Alter or modify an existing initiative	382	91.2
Discontinue an existing initiative	24	5.7

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Number of initiatives where the Clinical Communiqué was used to change practice[a]		
One	151	36.0
Two	175	41.8
Three	63	15.0
Four	12	2.9
Five or more	19	4.5
Degree to which the Clinical Communiqué influenced practice change[a,b]		
Selecting area of improvement	306	73.0
Defining the scope of the project	173	41.3
Engaging senior management	189	45.1
Engaging point of care staff	276	65.9
Identifying required resources	203	48.5
Setting project timelines	76	18.1
Gathering background research/analysis	227	54.2
The Clinical Communiqué influenced practice change[a,c]		
By raising awareness of an issue	409	97.6
By engaging staff	354	84.5
Because of the authority of the publication	310	74.0
By suggesting improvement strategies	359	85.7
By prompting staff to evaluate their existing practice	369	88.1
If the Clinical Communiqué had not been available, the change would have[a,c]		
Happened anyway	129	30.8
Taken longer	347	82.8
Happened on a smaller scale	236	56.3
Not occurred	109	26.0

[a]77 respondents failed to answer this question and were excluded from analysis (N=419)
[b]Five-point Likert scale, 5=strongly agree to 1=strongly disagree. Positive responses are counted as the sum of responses that stated 'strongly agree' and 'agree'
[c]Five-point Likert scale, 5=extremely influential to 1=not at all influential. Positive responses are counted as the sum of responses that stated 'extremely influential' and 'very influential'

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Box 2.

Reach of the Clinical Communiqué

As the CC is delivered via email, it is difficult to determine exactly how many people are being exposed to the contents of the CC. Therefore by asking respondents how many people have access to the CC at their workplace, it was calculated that for this sample of 1,008 respondents, the CC reached between 28,575 and 30,958 people. Therefore, each person on average, shared the CC with at least 9 other people.

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Characteristic	Changed practice n	Changed practice %	Did not change practice n	Did not change practice %	Multivariate odds ratio (95% confidence interval)	Chi-Square	p-value (bivariate)
Age (years)[a]							
45-54	160	52.8	143	47.2	1.00		
<35	29	29.0	71	71.0	0.45 (0.27-0.77)*		
35-44	110	57.3	82	42.7	1.48 (0.99-2.22)		
>54	118	45.0	144	55.0	0.72 (0.50-1.04)	24.36	<0.01
Gender[a]							
Female	316	44.3	313	55.7	1.00		
Male	101	44.3	127	49.8	0.80 (0.55-1.17)	2.36	0.12
Professional role[a]							
Nurse	155	57.4	115	42.6	1.00		
Allied health	24	50.0	24	50.0	1.28 (0.63-2.62)		
Medical practitioner	95	40.4	140	59.6	0.49 (0.31-0.77)*		
Pharmacist	5	14.3	30	85.7	0.15 (0.05-0.40)*		
Quality and risk manager	55	56.1	43	43.9	1.07 (0.61-1.87)		
Other	83	48.5	88	51.5	1.03 (0.65-1.64)	33.42	<0.01
Years of experience[a]							
<6	81	45.0	99	55.0			
6-10	54	41.5	76	58.5			
11-15	50	44.6	62	55.4			
16-20	51	68.0	24	32.0			
>20	181	51.7	169	48.3	†	10.01	0.04
Workplace location[a]							
Hospital	238	48.4	254	51.6	1.00		
Government department	16	39.0	25	61.0	0.81 (0.38-1.72)		
Primary care	36	52.2	33	47.8	1.18 (0.68-2.02)		
Residential aged care service	75	70.1	32	29.9	1.95 (1.18-3.24)*		
Other	52	35.1	96	64.9	0.48 (0.31-0.75)*	32.39	<0.01
Frequency of patient contact (times per week)[a]							
Four or more	240	51.2	229	48.8	1.00		
Less than one	92	40.7	134	59.3	0.51 (0.33-0.81)*		
One	32	56.1	25	43.9	1.03 (0.54-1.95)		
Two or three	53	50.5	52	49.5	0.83 (0.52-1.33)	8.32	0.04

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Level of contact with the Coroners Court[a]							
Has not taken part in an inquest	331	46.6	380	53.4	1.00		
Taken part in an inquest	86	58.9	60	41.1	1.92 (1.24-2.98)*	7.40	<0.01
Has not provided a statement	315	48.3	337	51.7			
Provided a statement	102	49.8	103	50.2	ǂ	0.13	0.72
Has not contacted court to discuss if death was reportable	243	46.5	280	53.5	1.00		
Contacted court to discuss if death was reportable	174	52.1	160	47.9	1.15 (0.77-1.70)	2.59	0.11
Has not contacted court for other reasons	258	45.3	312	54.7	1.00		
Contacted court for other reasons	159	55.4	128	44.6	1.33 (0.93-1.91)	7.85	<0.01
Has had some form of contact with the Coroners Court	292	51.5	275	48.5	1.00		
No contact with the Coroners Court	125	43.1	165	56.9	0.97 (0.65-1.47)	5.41	0.02
Number of editions read[b]							
All (4)	270	59.0	188	41.0	1.00		
Some (1 or 2)	63	41.4	89	58.6	0.52 (0.34-0.81)*		
At least half (2 or 3)	163	50.0	163	50.0	0.70 (0.53-1.02)	15.84	<0.01
Amount of an issue read (pages)[c]							
All or almost all (4-6)	418	56.5	322	43.5	1.00		
Less than half (<3)	18	39.1	28	60.9	0.71 (0.33-1.52)		
Half (3)	60	40.0	90	60.0	0.71 (0.47-1.07)	17.34	<0.01

[a]135 respondents failed to answer this question and were not included in the analysis (N=873)
[b]19 respondents failed to answer this question and were not included in the analysis. 16 respondents had not read any editions and were unable to answer the question about practice change (N=973)
[c]63 respondents failed to answer this question and were not included in the analysis (N=945)
p<0.05*
ǂVariable dropped as p>0.25
†Variable dropped due to collinearity with age (r=0.41)

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Supplementary Table 2: Descriptive comparison of CC subscribers and survey respondents

	A Subscriber (N)	B Subscriber (%)	C Survey Respondents (n)	D Survey Respondents (%)	E Non-responders (n)	F Non-responders (%)	G Difference Survey vs. Non-response (%)
	3373	**100%**	**1008**	**100%**	**2365**	**100%**	
Gender							
Female	2270	67.3	643	63.8	1627	68.8	-5
Male	860	25.5	230	22.8	630	26.6	-3.8
(blank)	243	7.2	135	13.4	108	4.6	8.8
Age (years)							
≤34	547	16.2	101	10.0	446	18.9	-8.9
35 to 44	758	22.5	196	19.4	562	23.8	-4.4
45 to 54	930	27.6	308	30.6	622	26.3	4.3
55 and over	737	21.8	268	26.6	469	19.8	6.8
(blank)	401	11.9	135	13.4	266	11.2	2.2
Occupation							
Allied Health Professional	109	3.2	25	2.5	84	3.6	-1.1
Medical Practitioner	1074	31.8	240	23.8	834	35.3	-11.5
Nurse	1183	35.1	277	27.5	906	38.3	-10.8
Paramedic	108	3.2	24	2.4	84	3.6	-1.2
Pharmacist	137	4.1	35	3.5	102	4.3	-0.8
Quality and Risk Manager	194	5.8	99	9.8	95	4.0	5.8
Other	324	9.6	173	17.2	151	6.4	10.8
(blank)	244	7.2	135	13.4	109	4.6	8.8

Commentary

Gender:

The proportion of the survey participants who did not respond to the question about gender (13.4%) was much greater than the non-respondents (4.6%). The proportion of female subscribers who responded to the survey (63.8%) was lower than the non-respondents (68.8%).

The impact of this non-response bias on the overall findings is likely to be minimal as there is not any reason to consider that the gender of a health professional is an important factor in patient safety. While there are gender differences in workforce distribution of the health professional this is addressed specifically below.

Age:

The proportion of the younger subscribers, those aged 34 years or less, who did not respond to the survey (18.9%) was much greater than those who did (10.0%). Conversely, the proportions of older subscribers, those aged 55 years and older, who completed the survey (26.6%) was substantially more than non-respondents (19.8%).

The impact of this non-response bias is likely to be an overestimate of the impact of the PEM. The impact of PEM may have a lesser effect on a younger population who are less experienced and prefer to source information from their immediate supervisors. Another possibility is that younger health professionals may not have responded because they are not in a position within their organisation to influence practice. Another consideration is whether fewer young professionals responded due to the greater volume of electronic information they receive each day through their personal mobile devices.

Occupation:

The proportion of non-responders who listed their occupation as either medical practitioners (35.3%) or nurses (38.3%) was much greater than those who participated in the survey 23.8% and 27.5% respectively. Conversely, the proportion identifying as 'quality and risk managers' who did complete the survey (9.8%) was substantially more than non-respondents (4.0%).

The impact of this non-response bias on practice change could be bidirectional. The impact of PEM may be overestimated because the primary role of quality and risk managers is to change practice to improve patient safety. Potentially, they may have attributed the motivation for any change to the PEM rather than other local factors that were not immediately apparent. Conversely, the impact of PEM may have been underestimated with the lower response rates from medical practitioners and nurses who are often the primary decision makers in patient care and subsequently vital for any change in clinical practice.

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STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	**Comment [TP1]:** Completed.
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	**Comment [TP2]:** Completed.
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	**Comment [TP3]:** Completed.
Objectives	3	State specific objectives, including any prespecified hypotheses	**Comment [TP4]:** Completed.
Methods			
Study design	4	Present key elements of study design early in the paper	**Comment [TP5]:** Completed.
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	**Comment [TP6]:** Completed.
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	**Comment [TP7]:** Completed.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	**Comment [TP8]:** Completed.
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	**Comment [TP9]:** Completed.
Bias	9	Describe any efforts to address potential sources of bias	**Comment [TP10]:** Completed.
Study size	10	Explain how the study size was arrived at	**Comment [TP11]:** Completed.
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	**Comment [TP12]:** Completed.
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	**Comment [TP13]:** Completed.
		(*b*) Describe any methods used to examine subgroups and interactions	
		(*c*) Explain how missing data were addressed	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	**Comment [TP14]:** Completed.
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	**Comment [TP15]:** Completed.
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	**Comment [TP16]:** Completed
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	**Comment [TP17]:** Completed
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for	

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		a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	**Comment [TP18]:** Completed.
Discussion			
Key results	18	Summarise key results with reference to study objectives	**Comment [TP19]:** Completed.
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	**Comment [TP20]:** Completed.
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	**Comment [TP21]:** Completed
Generalisability	21	Discuss the generalisability (external validity) of the study results	**Comment [TP22]:** Completed.
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	**Comment [TP23]:** Completed.

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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