The background is a light beige color with a pattern of overlapping circles in shades of grey, white, and orange. A prominent horizontal band of orange, resembling a torn piece of paper, runs across the middle of the page. The text is centered within this orange band.

**Outcomes following hospitalised suicidal behaviour
in the Northern Territory and opportunities for
prevention
FINAL REPORT**

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Key Messages

This study aimed to identify characteristics of NT residents at higher risk of subsequent suicidal ideation, intentional self-harm and suicide following an initial hospitalisation involving suicidal behaviour.

- A total of 4,495 individuals aged 10 years or above were admitted to a public hospital in the NT between 2001 and 2013 with a diagnosis of suicidal ideation, intentional self-harm or both.
- The rate of hospitalisations involving suicidal behaviour for NT residents has significantly increased every year since 2000, especially for the Indigenous population.
- The risk of subsequent suicidal behaviour is increased for the first 6 to 12 months following initial hospitalisation. The risk of suicide remained elevated for approximately 24 months following a hospitalisation involving suicidal behaviour.
- The Indigenous cohort was found to be consistently at higher risk of subsequent suicidal ideation, intentional self-harm and suicide following a hospitalisation involving suicidal behaviour.
- The risk of subsequent suicidal ideation and suicide differed by sex. Non-Indigenous males and Indigenous females were at higher risk of subsequent suicidal ideation. Males were at almost four times higher risk of suicide compared to females following hospitalised suicidal behaviour.
- Age was an important distinguishing factor. Indigenous youth and older non-Indigenous residents were found to be at higher risk of suicidal ideation and suicide. Older residents of the Darwin region and younger residents in the rest of the NT were at higher risk of subsequent intentional self-harm.
- Differences in the risk of subsequent suicidal behaviour was found by geographic location, but mostly in association with other socio-demographic characteristics such as age and Indigenous status.
- Psychiatric comorbidity was associated with an increased risk of subsequent suicidal ideation and intentional self-harm for the non-Indigenous population.
- The risk of subsequent suicide increases with the number of hospitalisations involving intentional self-harm, irrespective of the type of initial suicidal behaviour.
- A higher proportion of the Indigenous cohort hospitalised for suicidal ideation were identified with primary and mental health service contacts. Further analysis of associations between patterns of service usage and these outcomes may help to better identify opportunities for prevention.

Implications

- The findings suggest the need for assertive follow-up that involves comprehensive assessment of proximal risk factors in the first 6 to 12 months following hospitalisation involving suicidal behaviour.
- Monitoring and ongoing support for at-risk individuals is recommended for at least 2 years following hospitalisation for intentional self-harm.
- Preventive efforts for Indigenous people need to be developmentally and culturally appropriate and focused more on community-based settings responding to social and contextual factors.
 - A holistic approach to the social and emotional wellbeing of indigenous clients should inform preventive follow-up of hospitalisations for suicidal behaviour having regard for age and gender.
 - A better understanding is needed of barriers to service access and help-seeking behaviours of Indigenous residents at risk of suicidal behaviour, especially for males.
 - Improving coordination between hospitals and Aboriginal community-controlled health organisations is needed to ensure continuity of care in a safe community-based setting.
 - There is a need to improve monitoring of suicidal behaviour in primary health care settings.

Executive Summary

The aims of this study were to identify risks of subsequent suicidal behaviour among Northern Territory residents admitted to hospital with diagnoses of suicidal ideation and/or intentional self-harm and to describe the association between patterns of health service usage and these outcomes in order to identify opportunities for improved preventive follow-up care.

All NT residents with a hospital admission that included a diagnosis of suicidal ideation or intentional self-harm between 2001 and 2013, inclusive, were recruited into the study. Preliminary analyses produced evidence of increasing trends in hospitalised suicidal behaviour in the NT, especially within the Indigenous population. A follow-up study was designed to investigate whether the risk of subsequent suicidal ideation, intentional self-harm and suicide differed by key characteristics.

A consistent finding of this follow-up study was that Indigenous residents of the NT with a hospital admission involving suicidal behaviour were at higher risk of subsequent suicidal ideation, intentional self-harm and death by suicide compared to non-Indigenous residents. The period of highest risk for these outcomes is during the first 6 to 9 months following hospitalised suicidal behaviour, with the risk of suicide remaining elevated for approximately 2 years. Important differences for each type of outcome studied are outlined below.

Risks for subsequent suicidal ideation

The risk of subsequent suicidal ideation peaked within the first 12 months following hospitalisation involving suicidal behaviour. Younger Indigenous females were at higher risk of subsequent suicidal ideation during the study. Non-Indigenous males were at higher risk compared to non-Indigenous females, but the risk for non-Indigenous females increased with age. Non-Indigenous residents of central Australia and Indigenous residents throughout the rest of the NT were found to be at higher risk of subsequent suicidal ideation.

Risks for subsequent intentional self-harm

The risk of subsequent intentional self-harm was greatest in the first 9 months after an initial hospitalisation involving suicidal behaviour. Overall, the risk was higher for Indigenous residents of the NT and males. In Darwin, the risk of subsequent intentional self-harm increased with age, while the risk increased in other parts of the NT with younger age. Psychiatric comorbidity was associated with higher risk for the non-Indigenous population. After accounting for these factors, there appeared to be no differences in risk by gender.

Risks for suicide

The risk of suicide increased for the first 12 months following a hospitalisation involving suicidal behaviour and remained elevated for approximately 24 months. Males were at a much greater risk of suicide compared to females following hospitalised suicidal behaviour. The younger Indigenous and older non-Indigenous population were at higher risk of suicide. The risk of suicide increased with each subsequent hospitalisation involving intentional self-harm.

Patterns of health service contacts

Using confidential data linkage we were able to identify that just under half of the Indigenous cohort from the study had contacts with one or more of the major mental and primary health service providers in the NT. The Indigenous cohort which had recent health service contacts had a higher proportion of hospitalised suicidal ideation compared to those without. However, those without recent health service contacts had a higher proportion of hospitalised intentional self-harm. Although no differences in suicide were found between the Indigenous cohort with and without records of health service contacts, there appeared to be some differences in suicidal behaviour based on psychiatric diagnoses recorded for the Indigenous cohort case managed by NT Mental Health that warrant further investigation.

An audit of referrals to Central Australian Aboriginal Congress (CAAC) from Alice Springs Hospital was conducted to identify any cases with mention of suicidal behaviour. The number of referrals involving suicidal behaviour was low. Further investigation is needed to determine whether suicidal behaviour was not being recorded on referrals at CAAC or referrals of CAAC clients were not received from the hospital. Understanding the reasons for this under-recording of suicidal behaviour might improve the co-ordinated follow-up care for CAAC clients who have been hospitalised for suicidal behaviour.

Implications

While the high rates of suicide in the Northern Territory are well known, especially amongst Indigenous residents, there has been very little investigation of risk factors to inform strategic preventive action across the population. Hospitalised suicidal behaviour is a well-known indicator of a higher risk of subsequent suicide across many populations. If appropriately assessed, hospitalisation involving suicidal behaviour offers the opportunity for improved hospital care and referral for preventive treatment and follow-up that can reduce subsequent suicidal behaviour.

The findings from this study suggest that the first 6 to 12 months following hospitalisation involving suicidal behaviour were potentially crucial for provision of preventive support. During this period, assertive follow-up involving comprehensive assessment of proximal risk factors appears to be justified. Monitoring of clients for up to 2 years following hospitalisation is recommended. This would require attention to systematic collection and coordination of data on suicidal behaviour. The Aboriginal community-controlled health sector can play an important role, since a large number of the Indigenous patients in our study were found to have been clients of these services. Improvements in coordination between hospitals and health care services would improve follow-up, continuity of care and ongoing monitoring.

Preliminary findings of the study suggest that the Indigenous cohort with a mental health case management history may be at higher risk especially for some diagnoses. Further investigation of the risk profile of the Indigenous clinical population with a history of hospitalised suicidal behaviour is warranted.

Re-analysis of current data is needed to identify whether or not primary health services had a preventive effect or whether their clients were at lower initial risk to begin with.

Approach

This project combined the results of a retrospective follow-up study using confidential data linkage with a collaborative framework for research translation and capacity enhancing activities to develop and maximise the impact of the findings from this project.

The collection of data, interpretation of the results of analysis and conclusions drawn from this study were developed closely with the partners in the study CAAC in Alice Springs, Danila Dilba Health Service in Darwin and Palmerston and the Mental Health and the Remote Health Branches of the NT Department of Health. These organisations are key providers of primary and mental health to Indigenous residents of the NT and, therefore, have an active interest in understanding the patterns of health service usage for the Indigenous cohort of this study and how the findings might translate into policy and practice.

Ethics approval was granted by the Human Research Ethics Committee of Northern Territory Department of Health and Menzies School of Health Research (Reference: 2013-1992), the Central Australian Human Research Ethics Committee (Reference: 13-150) and the Australian Institute of Health and Welfare Ethics Committee (Reference: 2013-3-31).

The study cohort was identified from the Hospital Separations Dataset maintained by the NT Department of Health. Confidential data linkage techniques were then used to obtain mortality data and, for the Indigenous cohort, records of primary and mental health service contacts. Linkage was undertaken by specified personnel who were independent of the research team, so that no possibility of identification of persons across or within datasets could arise.

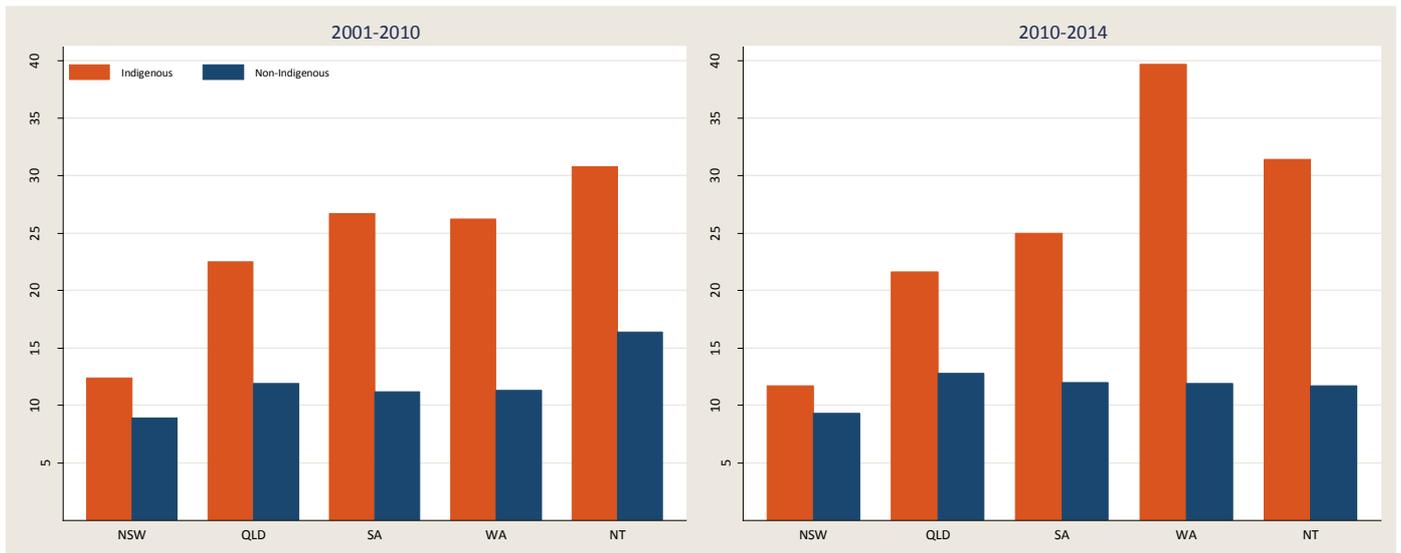
Survival analysis was used to identify the characteristics and factors that placed individuals in our study cohort at higher risk of suicidal ideation, intentional self-harm and suicide following the initial hospitalisation involving suicidal behaviour. Descriptive summaries of the characteristics and outcomes of the Indigenous study cohort with and without contacts with primary and mental health services participating in the study were used to raise further questions about any opportunities and gaps in prevention.

Additionally, a small audit study was undertaken with CAAC to identify post-discharge referrals from Alice Springs Hospital involving suicidal behaviour as a means to improve the recording and monitoring suicidal behaviour of their clients for follow-up.

Context

Suicide in the Northern Territory is a major public health problem. The rates of suicide in NT have been increasing since 1982 (Measey et al, 2005b) and between 2001 and 2010 were the highest of any jurisdiction and have remained well above national averages for some time, especially for the resident Indigenous population (see Figure 1 below).

Figure 1 Rates of suicide in NSW, Queensland, WA and NT by Indigenous status, 2001 – 2010 (Source: ABS, 2012) and 2010-2014 (Source: ABS, 2016a)



The most recent statistics suggest very little is changing. In 2014, suicide was the fifth leading overall cause of death for Indigenous Australians and the Indigenous suicide rate across Australia was twice that of the non-Indigenous population (ABS, 2016b). Western Australia's Indigenous rate of suicide rose to above 46 per 100,000 population in 2014 and the NT's Indigenous suicide rate also rose to 34.6 per 100,000 (ABS, 2016b). As the rates of Indigenous suicide show no signs of abating the need for effective prevention remains urgent.

However, we know very little about how to prevent suicide amongst the Indigenous population. In the NT some descriptive studies have highlighted key factors associated with Indigenous suicide (Kuipers et al, 2012), with some more detailed studies of Indigenous suicide in the Top End (Parker and Ben-Tovim, 2002) and amongst children and youth (Robinson et al, 2012). These studies have emphasised the importance of socially mediated factors on the likelihood of suicide compared to the more clinical and individual concepts of risks identified by clinical and epidemiological studies in the general population (Silburn et al, 2014). However, from both clinical and non-clinical perspectives, studies of Indigenous suicide consistently point to the importance of previous suicidal behaviour as a focus for prevention.

Hospitalised suicidal behaviour and the risk of subsequent suicide

Although not all suicidal behaviour leads to hospitalisation (De Leo et al, 2005; Martin et al, 2010), hospitalised suicidal behaviour has been found to be an important indicator of higher risk for subsequent suicide, with estimates of up to 1 in 4 patients hospitalised for self-harm killing themselves within 5 years (Carroll et al, 2014). Numerous reviews have identified this to be the case amongst different groups, including youth (Gould et al, 2006; Hawton et al, 2012) and clinical populations (Harris and Barraclough, 1997) such as people diagnosed with schizophrenia (Hor and Taylor, 2005), bipolar disorders (Hawton et al, 2005) and depression (Hawton et al, 2013). More importantly, a review of follow-up studies found the risk

of suicide following hospitalised suicidal behaviour to be up to hundreds of times higher than the general population (Owens et al, 2002) making hospitals an important site for prevention.

However, not all non-fatal suicidal behaviour leads to suicide. One systematic review estimated that 17% of self-harm hospital patients repeated this behaviour and 2% resulted in suicide (Owens et al, 2002). Follow-up studies offer some insights into factors placing individuals at greater risk of repeated suicidal behaviour, but the results vary greatly and few stable predictors have been identified across different population groups (see Beghi et al, 2013). The presence of psychiatric conditions has consistently been found to place individuals at higher risk of suicide following hospitalised suicidal behaviour (Christiansen and Jensen, 2007). Some studies show that there is a higher risk of subsequent suicide amongst male attempters (Carroll et al, 2014). Not only does the overall risk of suicide vary based on the type of initial suicidal behaviour (Runeson et al, 2010; Bergen et al, 2012), but the risks of subsequent suicide vary by type of mechanism as well, with firearms and hanging tending to have the highest risk (Owens et al, 2002). Few Australian studies exist investigating outcomes of hospitalisations involving suicidal behaviour (Reith et al, 2004) and none have focused on the Indigenous population. This study aims to close that gap in the evidence base by investigating the outcomes following hospitalised suicidal behaviour in the NT with a focus on Indigenous residents.

Identifying opportunities for prevention following hospitalised suicidal behaviour

Hospitals represent an important link in the chain of preventive treatment and care following suicidal behaviour (Boyce et al, 2003). In the first instance they provide the opportunity for a thorough assessment and screening of suicide risk upon which immediate and post-discharge management and care can be based. Whilst the reliability of suicide risk screening tools requires some improvement (USPSTF, 2004), numerous clinical guidelines instead encourage timely and comprehensive risk and psychosocial assessment as a more informative approach to appropriate short term management and longer term prevention (Boyce et al, 2003).

Based on the available evidence, a number of effective interventions exist that can often begin with short term management and care in hospital. Consistent findings have been found for psychosocial interventions aimed at improving problem solving and coping following hospitalised suicidal behaviour (van der Sande et al, 1997; Hawton et al, 1998). However, treatment adherence and help-seeking behaviour is generally poorer amongst suicidal patients (De Leo et al, 2005; Michelmore and Hindley, 2012). A number of different programs beginning with hospital care and management and ranging from enhanced usual care, improved case management and assertive outreach have shown promising results in improving treatment adherence (Hawton et al, 1998). Pharmacological interventions have also been shown to be effective with some clinical populations as have brief contact interventions (Hawton et al, 1998).

The extent to which these interventions may be appropriate for Indigenous populations at risk of suicide is unknown. A strategic approach to prevention must begin with an understanding of the onset of risk and factors that subsequently lead to further suicidal behaviour. Hospitalisation of Indigenous people involving suicidal behaviour has been on the rise for some time across Australia (Harrison and Henley, 2014) and the NT (Measey et al, 2005b). Given the consistent finding of hospitalised suicidal behaviour as an important indicator of higher risk for suicide, it is therefore important to investigate the degree to which hospitals offer an opportunity for the prevention of suicidal behaviour in the Indigenous population. Understanding the outcomes following hospitalised suicidal behaviour and the characteristics of those most at risk of

further suicidal behaviour can assist hospitals with directing Indigenous patients to the most appropriate available outpatient care. It can highlight gaps in the chain of available post-discharge care and support for Indigenous residents of the NT that would also need to be the focus of a strategic approach to prevention.

On the basis of these considerations, this study was established to investigate outcomes for all patients admitted to a public hospital in the NT with a diagnosis of suicidal ideation or intentional self-harm including an analysis of health service usage in order to identify characteristics of subsequent risk and to illuminate opportunities for prevention.

Approach

To ensure maximum impact of the research, this project was based on quantitative analyses using linked data from multiple sources combined with research translation and capacity building activity in collaboration with major health service providers responsible for care of NT residents who may engage in suicidal behaviour.

The study population included all patients admitted to a public hospital in the NT with a diagnosis of suicidal ideation and/or intentional self-harm between 2001 and 2013. Confidential linkage techniques were used to obtain data additional data on the study population relating to primary and mental health service usage and mortality outcomes that were included in the analyses described below.

Additionally, two smaller scale projects were designed to supplement the findings used to discuss outcomes and identify opportunities for prevention. The available hospital data used in the main study excluded non-admitted emergency department presentations. Therefore, a small exploratory audit study of all ED presentations involving suicidal behaviour was undertaken to better understand factors associated with different outcomes, including processes and practices related to admission and referral (see Appendix B for details). Further, an audit study was designed in collaboration with Central Australian Aboriginal Congress to identify suicidal behaviour in the discharge summaries received from Alice Springs Hospital to better understand the prevalence of hospitalised suicidal behaviour amongst their clients.

Taken together, the findings of these components of the study have formed the basis of ongoing research translation activities.

Analysis of patient outcomes following hospitalisation involving suicidal behaviour

Descriptive and trend analyses were undertaken of all hospitalisations involving suicidal behaviour to understand how they were distributed across key socio-demographic groups and over time.

Multivariate Cox regression models were used to estimate hazard ratios that describe the differences in the likelihood or “risk”¹ of further suicidal behaviour for different patient characteristics and clinical factors following an initial hospitalisation involving suicidal behaviour.

¹ A brief technical note is needed to explain the interpretation of hazard ratios estimated through Cox regression analyses as risk. In this report, hazard ratios have been interpreted as estimates of relative risk. Technically, however, hazard rates and the corresponding hazard ratios estimated do not represent the probability of an outcome occurring or not and, therefore, are not estimates of risks. Conceptually, however, it is possible to interpret hazard ratios as the “relative risk” of an outcome occurring after the onset of risk. That is, a risk interpretation of Cox regression estimates views the hazard ratio as the differential rate at which the outcome is likely to occur after the onset of risk based on the values of covariates.

Identifying patterns of health service utilisation by Indigenous hospital patients

Data linkage techniques were used to confidentially obtain the records of primary and mental health service contacts for the Indigenous participants in this study. Records of service events and other clinically relevant data were collected from the NT Department of Health and two Aboriginal community-controlled health organisations (ACCHOs), Central Australian Aboriginal Congress (CAAC) in Alice Springs and Danila Dilba Health Service (DDHS) in Darwin and Palmerston.

Records of mental health service contacts

The NT Mental Health Branch provides public mental health services delivering specialist, inpatient and community care across the Northern Territory. The NT Mental Health Branch maintains dedicated teams tasked with response to hospitalised suicidal behaviour. Individuals admitted to hospital with suicidal behaviour and considered at risk are typically referred to NT Mental Health Service for further assessment and care. Mental health assessments and care in the public hospital system are undertaken by NT Mental Health staff. Outpatient care is also administered by NT Mental Health, including brief interventions and follow up care and management following hospitalisation.

Individuals can have a variety of contacts with NT Mental Health that may be administrative or clinical in nature. Because research evidence points to a higher risk of suicide within clinical populations, the analysis focused on members of the Indigenous cohort from the study who were NT Mental Health clients between 2010 and 2015 and had a history of being case managed for diagnosed psychiatric conditions.

Records of primary health service contacts

The majority of primary health services for Indigenous residents in the NT are provided at clinics run by either the Remote Health Branch of the NT government's Department of Health or by ACCHOs. The NT Remote Health Branch is the public primary health service providing health and support services to remote communities across the NT. DDHS was established in 1991 and provides comprehensive primary health care and community services for most of the Indigenous residents of the greater Darwin region. CAAC was established in 1973 and is one of the largest ACCHOs in the NT, meeting the health needs of Indigenous people across central Australia. Both CAAC and DDHS provide general primary health care, some specialist services, men's and women's health services, child & family programs and social & emotional wellbeing services to their clients. The availability of data differed for each service – NT Remote Health and DDHS provided data from 2010 to 2015 and CAAC provided data from 2005 to 2015.

Due to the variable scope of the health service data available (see Appendix A), the analysis is limited to describing differences in the characteristics and outcomes of the Indigenous cohort identified in the study with and without service contacts who were alive up to the beginning of 2010 when all data for primary health care service usage is available.

Research translation and Indigenous capacity building

Partnerships established with NT Department of Health, DDHS and CAAC ensured that research translation activities were aligned with the policies and principles of clinical governance and research collaboration at each organisation.

Research translation activity to date has primarily involved a series of consultations at which reports of trend and survival analyses, additional analyses requested by partners, discussion of implications for

practice and policy and recommendations for preventive action and further research were presented for discussion.

As outlined above, this activity included a report of findings from a small audit study conducted in conjunction with CAAC to review referrals received from Alice Springs Hospital to identify the recording of suicidal behaviour post-discharge in CAAC records. The project was also used as a professional development opportunity for an Indigenous member of staff at CAAC to enhance her research and writing skills and knowledge of research on Indigenous suicide and social and emotional wellbeing.

Analysis of patient outcomes following hospitalised suicidal behaviour

A total of 4,495 individuals were admitted to a public hospital in the NT between 2001 and 2013 with a diagnosis of suicidal ideation, intentional self-harm or both. Individuals aged 9 years or below at the time of this hospitalisation have not been included in this analysis to both preserve confidentiality and to ensure the analysis is not skewed by possibly extreme cases.

During this period, overall trends in hospital admissions with a diagnosis of suicidal behaviour increased, especially within the Indigenous population and for admissions involving suicidal ideation (see Figure 2). This study aimed to investigate whether these admissions were associated with an increase in risk of subsequent suicidal behaviour after the first admission.

Figure 2 Trends in rates of hospitalisation involving suicidal ideation and intentional self-harm by Indigenous status and sex, NT 2001-2013 (Leckning et al, 2016)

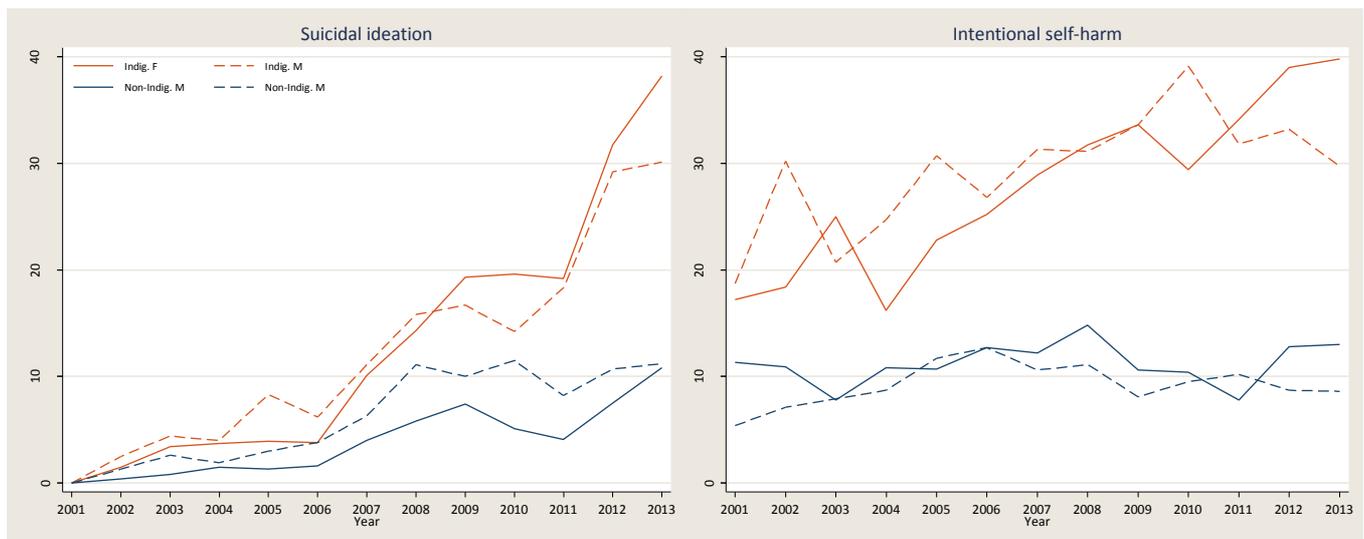


Table 1 provides a summary of the baseline characteristics², subsequent hospitalised suicidal behaviour and mortality outcomes for the full study cohort.

Table 1 Frequency and percentage of Indigenous and non-Indigenous population hospitalised for suicidal behaviour by socio-demographic characteristics, comorbidities and subsequent suicidal behaviours, NT 2001-2013

	Non-Indigenous		Indigenous		Total	
	n	col %	n	col %	n	col %
Total	2,123	100%	2,360	100%	4,483	100%
Sex						
Female	970	46%	1,157	49%	2,127	47%
Male	1,153	54%	1,203	51%	2,356	53%
Residence at baseline						
Darwin Urban	1,346	63%	394	17%	1,740	39%
Darwin Rural	49	2%	247	10%	296	7%
Katherine	151	7%	317	13%	468	10%
East Arnhem	58	3%	326	14%	384	9%
Barkly	41	2%	222	9%	263	6%
Alice Springs Urban	448	21%	443	19%	891	20%
Alice Springs Rural	30	1%	411	17%	441	10%
Age (years) at baseline	33	-	28	-	30	-
Alcohol involvement at baseline						
No	1,438	68%	1,311	56%	2,749	61%
Yes	685	32%	1,049	44%	1,734	39%
Psychiatric diagnosis at baseline						
No	533	25%	811	34%	1,344	30%
Yes	1,590	75%	1,549	66%	3,139	70%
Suicidal behaviour at baseline						
SI	666	31%	649	28%	1,315	29%
ISH	1,457	69%	1,711	73%	3,168	71%
Self-poisoning	1,011	48%	459	19%	1,470	33%
Sharp object	241	11%	725	31%	966	22%
Hanging	105	5%	384	16%	489	11%
Other ISH	100	5%	143	6%	243	5%
Subsequent suicidal ideation						
None	1,870	88%	2,063	87%	3,933	88%
One or more	253	12%	296	13%	549	12%

² Baseline refers to the initial hospital separation involving suicidal behaviour that triggered inclusion in the study.

	Non-Indigenous		Indigenous		Total	
	n	col %	n	col %	n	col %
Subsequent intentional self-harm						
None	1,788	84%	1,900	81%	3,688	82%
One or more	335	16%	460	19%	795	18%
Mortality						
Alive	1,978	93%	2,190	93%	4,168	93%
Suicide	36	2%	43	2%	79	2%
Other COD	109	5%	127	5%	236	5%

Compared to the non-Indigenous cohort, there was a slightly higher proportion of females in the Indigenous cohort. Most Indigenous patients were from remote areas (with the exception of Alice Springs) and Indigenous patients were younger overall. The increasing trends in the Indigenous population, especially among youth and females, suggested that they were at higher risk of hospitalisation involving suicidal behaviour (see Leckning et al, 2016).

Relevant comorbid conditions at baseline also differed by Indigenous status, with a higher proportion of psychiatric diagnoses within the non-Indigenous cohort and alcohol involvement higher within the Indigenous cohort.

Whilst suicidal ideation was spread evenly by Indigenous status, a higher proportion of intentional self-harm hospitalisations were Indigenous. Similarly, the spread was even between the Indigenous and non-Indigenous cohorts for suicidal ideation but was higher for the Indigenous cohort for subsequent intentional self-harm. These differences appeared to be mostly a result of increasing trends in hospitalisations resulting from intentional self-cutting by Indigenous males and females (see Leckning et al, 2016).

Mortality outcomes were similar for both the Indigenous and non-Indigenous cohort. It should be noted that although suicide was the single leading cause of death within this cohort, the vast majority of deaths were due to other causes with external causes of death ranking highest overall (see Appendix C for a more detailed summary of mortality in the study cohort).

This descriptive analysis highlights key differences in the overall distribution and trends of hospital suicidal behaviour by Indigenous status. It suggests that the Indigenous population was at highest risk of hospitalised suicidal behaviour in the NT with some important differences according to other socio-demographic characteristics and comorbid conditions. These considerations formed the basis of the survival analyses presented below that aim to better explain the risk of subsequent suicidal behaviour and suicide over time.

Risks for subsequent hospitalisations involving suicidal ideation

A total of 3,463 subjects were included in the analysis. A total of 435 subsequent hospitalisations for suicidal ideation were found. Average follow up time was 72 months (median was 68 months), with a minimum of 1 day and a maximum of 14 years of follow up across the cohort.

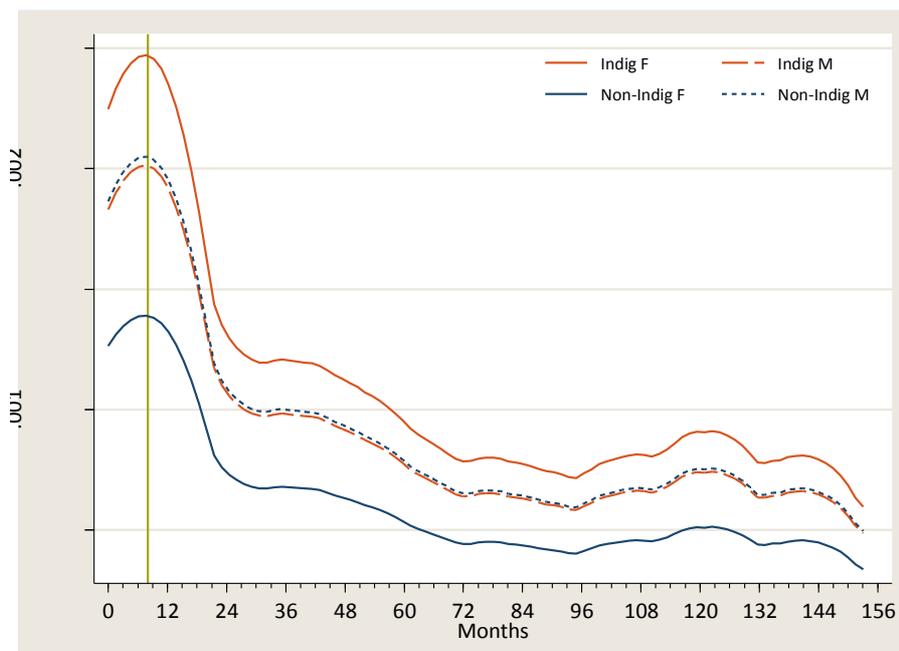
The results of multivariate Cox proportional hazards regression analysis are shown in Table 2 below.

Table 2 Association between socio-demographic characteristics and comorbidities at baseline with subsequent hospitalised suicidal ideation by NT residents hospitalised for suicidal behaviour between 2001-2011³

	Hazard Ratio	P>z	Confidence Interval (95%)
Male	1.48	0.01	1.10 - 1.98
1 year increase in age	1.02	0.00	1.01 - 1.03
Central Australian resident	2.28	0.00	1.71 - 3.04
Had psychiatric comorbidity	1.49	0.00	1.19 - 1.88
Indigenous	1.78	0.00	1.27 - 2.50
x 1 year increase in age	0.97	0.00	0.96 - 0.99
x Male	0.55	0.00	0.37 - 0.82
x Central Australian resident	0.59	0.01	0.40 - 0.87

As can be seen from Figure 3 below, the risk of subsequent hospitalised suicidal ideation increases for the first 8 months following initial hospitalisation for suicidal behaviour. This decreases steeply until around the 24 month mark, dipping below the level of initial risk after approximately 12 months.

Figure 3 Smoothed relative hazard of subsequent suicidal ideation by Indigenous status and sex following hospitalisation for suicidal behaviour in the NT between 2001 and 2011



Although the Indigenous and male population were at higher risk of subsequent hospitalised suicidal ideation (78% and 48% higher, respectively), Indigenous females were at higher risk compared to Indigenous males (45% lower risk than females) (see Figure 3).

Whereas the overall risk of subsequent hospitalised suicidal ideation increased 2% with each year of age above the median (33 years of age at baseline), the opposite held for the Indigenous population – the risk of subsequent hospitalised suicidal ideation increased with each year below the median. It should be noted that age differences were not statistically significant for males, so this only applied to females.

³ The reference categories used for this analysis were non-Indigenous, female, age of 33 years at baseline, resident of Darwin region and no psychiatric diagnosis.

There were also important differences by residence, with central Australian residents being just over twice as likely to be hospitalised for suicidal ideation compared to residents for the rest of the NT. However, this differed by Indigenous status, with the risk for Indigenous residents of other parts of the NT higher than for Indigenous residents of central Australia.

Lastly, after adjusting for all the other factors, having a psychiatric comorbidity at baseline corresponded to an almost 50% higher risk of subsequent hospitalised suicidal ideation.

Key findings from analysis of subsequent suicidal ideation

- The period of highest risk for subsequent suicidal ideation was in the first 12 months following initial hospitalisation for suicidal behaviour.
- Younger Indigenous females were at higher risk of subsequent suicidal ideation during the study.
- Males were more at risk than females within the non-Indigenous cohort, with the risk increasing with age for non-Indigenous females.
- Non-Indigenous residents of central Australia and Indigenous residents of other parts of the NT were at higher risk.
- Psychiatric comorbidity was associated with higher risk of subsequent suicidal ideation.

Risks for subsequent hospitalisations involving intentional self-harm

A total of 3,467 subjects were included in the analysis. A total of 697 subsequent hospitalisations for intentional self-harm were found. Average follow up time was 65 months (median was 61 months), with a minimum of 1 day and maximum of 14 years of follow up across the cohort.

The results of multivariate Cox proportional hazards regression analysis are shown below.

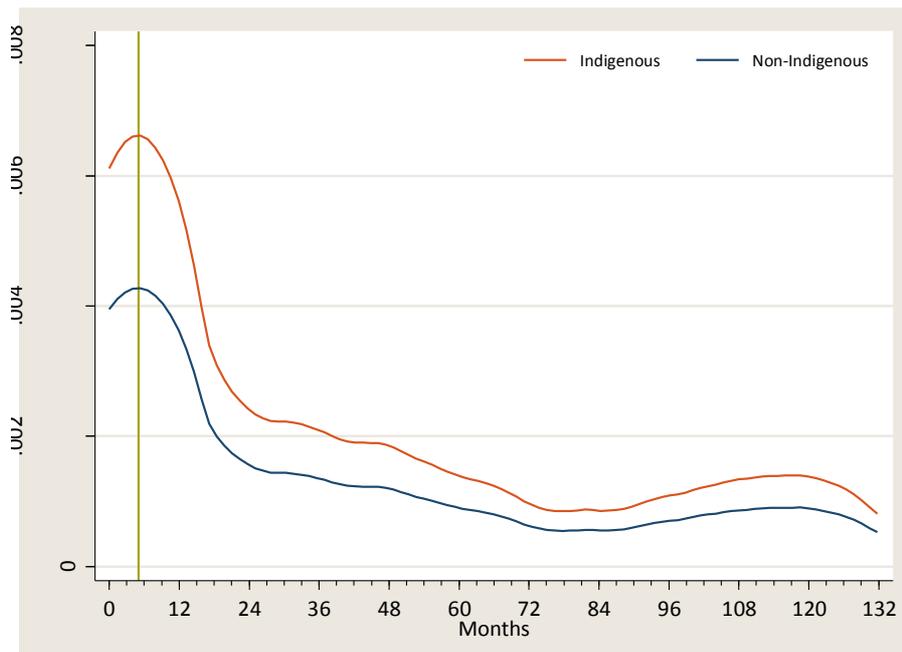
Table 3 Association between socio-demographic characteristics and comorbidities at baseline with subsequent hospitalised intentional self-harm by NT residents hospitalised for suicidal behaviour between 2001-2011⁴

	Hazard Ratio	P>z	Confidence Interval (95%)
Male	1.03	0.66	0.89 - 1.20
1 year increase in age	0.99	0.16	0.98 - 1.00
Darwin region resident	1.36	0.00	1.15 - 1.60
x 1 year increase in age	1.02	0.00	1.01 - 1.03
Alcohol involvement	1.32	0.00	1.11 - 1.57
Had psychiatric comorbidity	1.35	0.05	1.00 - 1.82
Indigenous	1.55	0.01	1.12 - 2.14
x Had psychiatric comorbidity	0.68	0.04	0.47 - 0.99

As can be seen from Figure 4 below, the risk of subsequent hospitalised intentional self-harm increased for the first 6 months following initial hospitalisation for suicidal behaviour. This decreased steeply until around the 24 month mark, dropping below the initial level of risk after approximately 9 months.

⁴ The reference categories used for this analysis were non-Indigenous, female, age of 33 years at baseline, NT resident outside of Darwin, no alcohol involvement and no psychiatric diagnosis at baseline.

Figure 4 Smoothed relative hazard of subsequent suicidal ideation by Indigenous status following hospitalisation for suicidal behaviour in the NT between 2001 and 2011



The Indigenous population was at 55% higher risk of subsequent intentional self-harm compared to the non-Indigenous population. However, this risk differed importantly by the presence of a psychiatric diagnosis. Whilst psychiatric diagnosis was found overall to be associated with a 35% higher risk of subsequent intentional self-harm, Indigenous patients with a psychiatric diagnosis were found to be at 32% lower risk of subsequent suicidal ideation compared to those without a psychiatric diagnosis.

Admissions with alcohol involvement at baseline was associated with 32% more risk of subsequent intentional self-harm.

The risk for subsequent hospitalised intentional self-harm was greater for Darwin residents compared to residents of other parts of the NT. Furthermore, the risk of subsequent intentional self-harm increased by 2% with each year of age above the median age at baseline (33 years of age) for Darwin residents, indicating older Darwin residents and younger residents in other parts of the NT were at higher risk during the study.

Importantly, there was no evidence for any differences in the risk of subsequent hospitalised intentional self-harm by sex after adjusting for other factors.

Key findings from analysis of subsequent intentional self-harm

- **The period of highest risk for subsequent hospitalisations involving intentional-self harm was in the first 9 months following initial hospitalisation for suicidal behaviour.**
- **Overall risk was higher for the Indigenous population and males.**
- **Older Darwin residents and younger residents from other parts of the NT were at higher risk.**
- **Psychiatric comorbidity was associated with higher risk for the non-Indigenous population and lower risk for the Indigenous population.**
- **No differences in risk were evident between males and females.**

Risks of subsequent suicide

A total of 4,486 subjects were included in the analysis. A total of 79 individuals died by suicide with 236 others censored due to deaths by other causes. Average follow up time was 75 months (median was 70 months), with a minimum of 1 day and maximum of 14 years of follow up across the cohort.

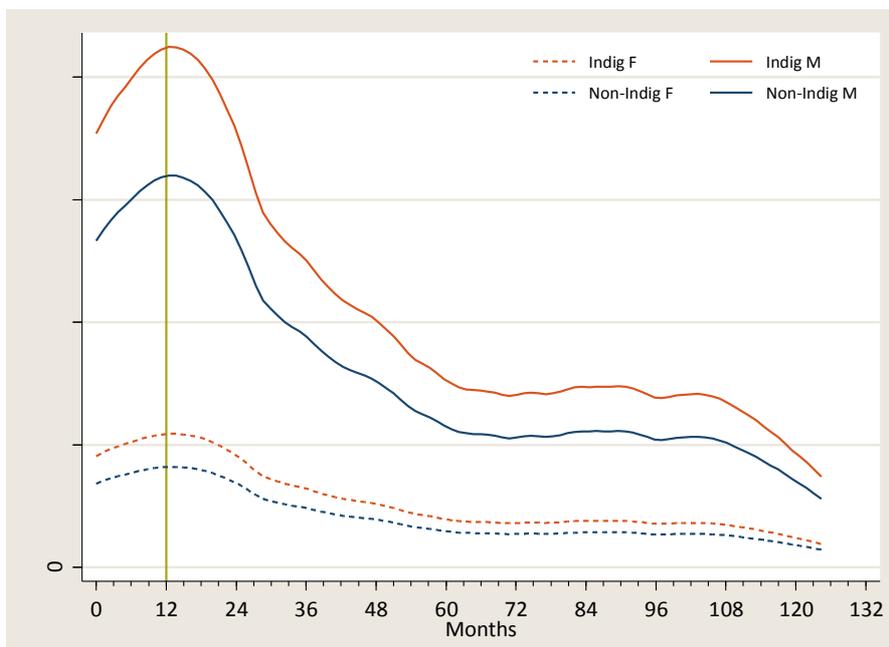
The results of multivariate Cox proportional hazards regression analysis are shown below.

Table 4 Association between socio-demographic characteristics and subsequent hospitalised intentional self-harm with suicide by NT residents hospitalised for suicidal behaviour between 2001-2013⁵

	Hazard Ratio	P>z	Confidence Interval (95%)
1 year increase in age	1.02	0.04	1.00 - 1.04
Indigenous	1.33	0.30	0.78 - 2.27
x 1 year increase in age	0.95	0.02	0.92 - 0.99
Male	3.90	0.00	2.15 - 7.08
Darwin region residents	1.88	0.01	1.15 - 3.07
No. of subsequent ISH	1.19	0.01	1.05 - 1.34
x Male	1.22	0.03	1.02 - 1.46

As Figure 5 illustrates, the overall risk of subsequent suicide increased for the first 12 months following initial hospitalisation for suicidal behaviour after which it decreased steadily, dropping below initial levels of risk at approximately the 24 month mark.

Figure 5 Smoothed relative hazard of suicide by Indigenous status and sex following hospitalisation for suicidal behaviour in the NT between 2001 and 2013



⁵ The reference categories used for this analysis were non-Indigenous, female, age of 33 years at baseline, NT resident outside of Darwin region and no subsequent hospitalisations involving ISH.

The risk of suicide for males following hospitalisation involving suicidal behaviour was almost four times greater than it is for females.

As Table 4 indicates, the risk was greater for the Indigenous population but this was entirely moderated by age at baseline. Whilst a 2% increase in risk was associated with each year of age above the median age at baseline (33 years of age), the risk of suicide increased with each year below the median for the Indigenous population. However, this only applied to males, as the interaction was not significant for the female cohort.

Darwin residents were at higher (88%) risk of suicide compared to residents of other parts of the NT.

Each subsequent episode of hospitalised intentional self-harm increased the risk of suicide by 19%. This was slightly higher for males who were at 22% increased risk over females for suicide for each subsequent intentional self-harm.

Key findings from analysis of subsequent suicide

- **The period of highest risk for suicide was in the first 24 months following hospitalisation for suicidal behaviour.**
- **The risk of suicide was higher for males compared to females and for residents of Darwin compared to other parts of the NT.**
- **The younger Indigenous population and older non-Indigenous population were at higher risk of suicide.**
- **The risk of suicide increased with each subsequent hospitalisation for intentional self-harm, especially for males.**

Identifying patterns of health service usage by Indigenous patients hospitalised for suicidal behaviour

The analysis presented below compares the characteristics and outcomes of the Indigenous cohort of the study with and without health service contacts in the data available to the study. This analysis is discussed with a view to informing strategies to enhance early intervention, immediate follow up care and longer term monitoring and surveillance of suicidal behaviour in the community.

It should be noted that the results here are merely indicative – any differences noted may simply be the result of the variable scope of the data and differences in follow-up as a consequence.

Mental health service usage

The table below compares the characteristics of the Indigenous study cohort who had not been case managed by NT Mental Health with those who had.

Table 5 Frequency and percentage of Indigenous study participants that were and were not case managed by NT Mental Health branch by socio-demographic characteristics, comorbidities, type of suicidal behaviour and mortality outcomes, NT 2001-2013

	No NT MH case management		NT MH case management		n	Total col %
	n	col %	n	col %		
Total	1,314	100%	1,054	100%	2,368	100%
Sex						
Female	616	47%	545	52%	1,161	49%
Male	698	53%	509	48%	1,207	51%
Age group						
0-14	33	3%	58	6%	91	4%
15-24	420	32%	404	38%	824	35%
25-34	415	32%	319	30%	734	31%
35-44	307	23%	196	19%	503	21%
45-54	115	9%	63	6%	178	8%
55+	24	2%	14	1%	38	2%
Residence						
Darwin Urban	196	15%	200	19%	396	17%
Darwin Rural	112	9%	136	13%	248	10%
Katherine	186	14%	132	13%	318	13%
East Arnhem	196	15%	130	12%	326	14%
Barkly	153	12%	71	7%	224	9%
Alice Springs Urban	235	18%	210	20%	445	19%
Alice Springs Rural	236	18%	175	17%	411	17%
Any suicidal ideation						
No	1,018	77%	481	46%	1,499	63%
Yes	296	23%	573	54%	869	37%
Any intentional self-harm						
No ISH	209	16%	377	36%	586	25%
Any ISH	1,105	84%	677	64%	1,782	75%
Mortality						
Alive	1,195	91%	1,003	95%	2,198	93%
Suicide	22	2%	21	2%	43	2%
Other COD	97	7%	30	3%	127	5%

The proportion of our Indigenous study cohort with a history of mental health case management was greatest amongst females, younger age groups, Darwin residents and those who had been hospitalised for suicidal ideation. There is a lower proportion of intentional self-harm and death by other causes amongst the cohort that had been case managed by NT Mental Health.

Table 6 below summarises the characteristics and outcomes of the total Indigenous cohort found with any NT Mental Health Branch contacts by the psychiatric diagnosis recorded at the last diagnostic assessment found in the records. All psychiatric diagnoses are coded using the ICD-10 standard, focusing on three

chapters that are known to reflect a higher risk of suicidal behaviour – schizophrenia, substance misuse and mood disorders.

Table 6 Outcomes by diagnoses recorded in NT Mental Health administrative records for Indigenous study participants with a mental health case management history.

	Schizophrenia		Substance misuse		Mood disorders		Other ⁶		Total	
	n	col %	n	col %	n	col %	n	col %	n	col %
Total	155	100%	164	100%	169	100%	557	100%	1,045	100%
Any suicidal ideation?										
No	67	43%	70	43%	74	44%	264	47%	475	45%
Yes	88	57%	94	57%	95	56%	293	53%	570	55%
Any intentional self-harm?										
No	62	40%	71	43%	61	36%	180	32%	374	36%
Yes	93	60%	93	57%	108	64%	377	68%	671	64%
Mortality										
Alive	146	94%	151	92%	163	96%	536	96%	996	95%
Suicide	4	3%	6	4%	1	1%	10	2%	21	2%
Other COD	5	3%	7	4%	5	3%	11	2%	28	3%

This summary shows that a higher proportion of suicidal ideation was found among Indigenous patients with a diagnosis of schizophrenia, substance misuse and mood disorders. The proportion of intentional self-harm was generally lower across the psychiatric diagnoses in focus and higher amongst others found. Although the numbers are small and have not been adjusted for the differences in socio-demographic and other characteristics, there is a higher proportion of suicide among Indigenous patients with a schizophrenia diagnosis and substance misuse. Broadly speaking, these results suggest the need to further investigate outcomes on the basis of psychiatric diagnoses being treated in order to ascertain whether schizophrenia and substance misuse may mediate the risk of suicide amongst Indigenous patients with hospitalisations involving suicidal ideation.

Primary health service usage

Although the data available from each service varied (see Approach), just over 65% (n=1,575) of the Indigenous cohort from the study were identified as having contact with one of these services recently. Some of the key differences in characteristics and outcomes are outlined below for those in the Indigenous study cohort still alive during the period of available data (2010-2015).

⁶ N.B. This category of diagnoses not only incorporates all other mental and behavioural disorder codes from the F chapter of the ICD-10 standard, but a large proportion are also Z codes reflecting social and other factors influencing health status and contact with health services (i.e. Z55 to Z99 codes).

Table 7 Frequency and percentage of Indigenous study patients that were and were not found to be clients of a primary health care service by socio-demographic characteristics, comorbidities, type of suicidal behaviour and mortality outcomes, NT 2001-2013

	Not primary health service client		Primary health service client		Total	
	n	col %	n	col %	n	col %
Total	733	100%	1,565	100%	2,298	100%
Health service						
NT Remote Health client (2010-2015)	-	-	1,047	67%	-	-
DDHS client (2010-2015)	-	-	369	24%	-	-
CAAC client (2005-2015)	-	-	705	45%	-	-
Sex						
Female	356	49%	780	50%	1,136	49%
Male	377	51%	785	50%	1,162	51%
Age group						
0-14	31	4%	59	4%	90	4%
15-24	263	36%	544	35%	807	35%
25-34	211	29%	497	32%	708	31%
35-44	165	23%	318	20%	483	21%
45-54	54	7%	121	8%	175	8%
55+	9	1%	16	1%	35	2%
Residence						
Darwin Urban	148	20%	232	15%	380	17%
Darwin Rural	11	2%	228	15%	239	10%
Katherine	179	24%	132	8%	311	14%
East Arnhem	210	29%	110	7%	320	14%
Barkly	76	10%	144	9%	220	10%
Alice Springs Urban	70	10%	363	23%	433	19%
Alice Springs Rural	39	5%	356	23%	395	17%
Any suicidal ideation?						
No	483	66%	952	61%	1,435	62%
Yes	250	34%	613	39%	863	38%
Any intentional self-harm?						
No	172	23%	410	26%	582	25%
Yes	561	77%	1,155	74%	1,716	75%
Mortality						
Alive	703	96%	1,492	95%	2,195	96%
Suicide	9	1%	17	1%	26	1%
Other COD	21	3%	56	4%	77	3%

Amongst the NT Indigenous population hospitalised with suicidal behaviour, there appeared to be few differences in socio-demographic characteristics between those identified with primary health service

contacts and those without. The noticeable differences by residence reflect the geographic reach of each of the primary health services involved in our study. It is not clear that the higher proportion of suicidal ideation and lower proportion of intentional self-harm among health care users should be interpreted to indicate that those with primary health service contacts were at lower risk of suicide. Preliminary analysis showed no difference in suicide outcome for these clients.

Key findings from analysis of patterns of health service usage

The findings below are framed as questions for further research in light of the preliminary descriptive analyses presented above.

- **Was the risk of suicide lower amongst the Indigenous population with better access to and use of health services?**
 - **Suicidal ideation was more prevalent within the Indigenous cohort study that used health services.**
 - **Intentional self-harm was more prevalent within the Indigenous cohort without health service contacts in the study.**
- **Did the risk of Indigenous suicide differ by type of service used?**
 - **The incidence of suicide amongst clients of primary health services was lower compared to those who are not.**
 - **The incidence of suicide for those who have and have not been case managed by NT Mental Health was similar.**
- **Did specific psychiatric conditions in need of managed clinical care increase the risk of suicide in the Indigenous population?**
 - **Further investigation is needed to determine whether Indigenous patients managed for schizophrenia and substance misuse are at higher risk of suicide.**
 - **Additionally, the relationship between these diagnoses and suicidal ideation should be explored with regard to ascertaining risk for Indigenous patients.**

Research translation and Indigenous capacity building

A number of processes were established with key stakeholders to ensure appropriate dissemination and discussion of this research to inform policies and practice for identifying, responding to and monitoring suicidal behaviour in the NT.

One of the key outputs from this process was the establishment of a study in partnership with CAAC that included capacity enhancing activities. This project is briefly outlined below after which a summary of potential outcomes from this and other research translation activities is provided.

CAAC audit of recent referrals from Alice Springs Hospital

In order to consider the practical implications of this research, health organisations must be able to identify suicidal behaviour within their client base. This study used data linkage techniques that are not available to health care providers for confidentiality reasons to investigate how well clients are identified for follow-up. Discussions with CAAC lead to the design of an audit study that would attempt to identify CAAC records for clients hospitalised for suicidal behaviour.

In recent years, staff at CAAC and Alice Springs Hospital had developed arrangements to ensure that referrals of any Indigenous patients on discharge are sent electronically to CAAC in a timely manner. The aim of this research project was to determine how to identify suicidal behaviour in these electronic discharge summaries and to summarise the key characteristics of these CAAC clients.

A further requirement of the project was to employ an Indigenous member of staff at CAAC, Roxanne Highfold, as a research assistant to work closely with project staff on data collection, entry, analysis, interpretation and writing up of the research to help develop her research skills and knowledge in the area of Indigenous social and emotional wellbeing and suicide prevention. Furthermore, her involvement would also ensure that all knowledge would be retained within CAAC after completion of the study, thereby improving prospects for implementing its recommendations.

The audit study involved reviewing all discharge summaries received by CAAC from Alice Springs Hospital over the course of 2015. An audit protocol was established to identify key clinical terms that would indicate a hospitalisation related to suicidal behaviour. Of the 8,709 discharge summaries reviewed, 34 cases of suicidal behaviour were identified in the CAAC client database. Seven of these cases already had a suicidal behaviour client item code. The cases of suicidal behaviour referred to CAAC from ASH were mostly female, concentrated in the 25-34 year age group and almost exclusively residents of Alice Springs. Just under half of all and the majority of intentional self-harm cases involved alcohol. Just over half of these cases had a chronic condition diagnosis in their health records and all had more than one diagnosis recorded. Contact with CAAC occurred on average 10 days prior to the hospitalisation for suicidal behaviour. On average, contact with CAAC following hospitalisation occurred in less than 10 days after discharge.

Initial discussion of these results suggests that there is a need for improvements to the timely identification and recording of suicidal behaviour in the CAAC database following hospitalised suicidal behaviour by clients. This will not only identify CAAC clients in need of follow-up but will provide more accurate data for long-term monitoring and surveillance of suicidal behaviour amongst CAAC clients. Considering the trends of hospitalised suicidal behaviour of CAAC clients found in the larger study (see Leckning et al, 2016), the number of discharge summaries found in 2015 appeared to be very low. It is unlikely that this reflected a drastic decrease in incidence and prevalence of cases during that year but rather that it reflected gaps in the referral process. It may also be the result of patient refusals to have their discharge summaries sent to their primary health care provider. This explanation might suggest that stigma attached to suicidal behaviour amongst Indigenous people leads to reluctance to support referral. If so, it would be important to address both gaps in the referral process between ASH and CAAC and to identify strategies to support acceptance of referrals by CAAC clients following hospitalised suicidal behaviour.

Key recommendations from CAAC Audit

- **Implement client item (i.e. diagnosis) codes for recording suicidal behaviour in the CAAC client database that are more in line with conventional coding standards used in primary health care.**
- **Adapt the audit study protocol for identifying suicidal behaviour into a policy and set of procedures for more accurately identifying and recording suicidal behaviour of CAAC clients discharged from Alice Springs Hospital following suicidal behaviour.**

- Investigate ways to create an alert within the CAAC database for clients that have recently been hospitalised for suicidal behaviour.
- Discuss options for more active follow-up with SEWB team.
- Health promotion campaign to reduce stigma associated with and improve help seeking-behaviour for hospitalised suicidal behaviour.
- Explore the relevance and applicability of these findings and recommendations to other ACCHOs.

Summary of findings

The risk of further suicidal behaviour increased and peaked within the first 6-12 months following initial admission to a hospital with suicidal behaviour.

The risks of further suicidal behaviour were generally found to be higher within the Indigenous population. This research has confirmed a number of hypotheses about Indigenous suicidal behaviour, at least amongst those who are hospitalised. Risks increased with younger age, were mostly associated with males (except for suicidal ideation) and intentional self-harm was more pronounced amongst those without a psychiatric diagnosis suggesting the greater influence of social determinants and social and emotional wellbeing. Considering the increasing trend in Indigenous hospitalised suicidal behaviour overall, a greater focus on early intervention and preventive follow-up is needed for Indigenous residents of the NT.

The results for suicidal ideation were mixed. The increasing trend in hospitalised suicidal ideation does not by itself reflect an increasing risk of suicide compared to the trends found for hospitalised intentional self-harm. However, this research also suggested that the risk of suicide following suicidal ideation may be mediated by other factors, such as psychiatric comorbidity. For the Indigenous population, this preliminary investigation of mental health contacts suggests the need to explore the relationship between schizophrenia and substance misuse as indicators of higher risk of suicide, especially in association with a history of suicidal ideation.

In terms of comorbidities, psychiatric diagnoses and alcohol involvement were indicators of higher risk. As noted, psychiatric comorbidities may be less meaningful for the Indigenous population with respect to preventing further intentional self-harm, but overall this study confirms their importance for identifying those that need to be targeted within existing regimes of treatment and support.

Preliminary analysis suggested that Indigenous persons with health service contacts, especially with primary health services, were less likely to be admitted with suicidal behaviour. Although there was generally a higher proportion of suicidal ideation within the Indigenous cohort with health contacts, there was a lower proportion of intentional self-harm and suicide. Further analysis is needed to more accurately identify any associations between health service contacts and suicidal behaviour for the Indigenous population.

Implications

Whilst this research has confirmed an association between Indigenous status and a higher risk of suicidal behaviour, there are important differences that have broad implications for prevention in the NT. The findings indicate that the factors associated with higher risk of subsequent suicidal ideation are substantially different to those associated with subsequent intentional self-harm and suicide following an initial hospitalisation involving suicidal behaviour of any kind. Not only was previous intentional self-harm

associated with a higher risk of suicide, but the characteristics of those at higher risk of both of these outcomes were similar to each other and differ to those associated with subsequent suicidal ideation. Suicidal ideation appears to be most associated with health service contacts in the NT. This suggests those at risk of subsequent intentional self-harm and suicide may be less likely to seek help from services and require a different or more proactive strategies for identification and preventive intervention.

The findings of this study suggest that there is a need to evaluate and improve existing preventive follow-up within mental and primary health care settings, especially for those who are at risk of subsequent intentional self-harm and suicide but who are not in contact with any health services. Further research is needed to investigate barriers to help-seeking amongst those at risk of intentional self-harm and suicide as the basis for designing active and coordinated follow-up strategies within the first 6 to 12 months following hospitalisation.

Discussions with key stakeholders of the results from this study have produced a number of research translation outputs and outcomes aimed at using these findings to inform policies and practices that support effective suicide prevention in the NT, especially for the Indigenous population. These research translation outcomes are summarised under three themes that represent the areas of action most appropriate to this kind of research and its findings: improved identification of suicidal behaviour across all sectors of health care, improved follow-up of hospitalised suicidal behaviour, enhancing capacity to support community-based suicide prevention.

Improved identification of suicidal behaviour

Outcomes achieved within the study

- **Clearer and simpler recording of suicidal behaviour in NT Mental Health records of referrals received and mental health assessments done in NT public hospitals.** The Crisis Assessment and Triage (CAT) team work in NT public hospitals to assist physicians assess, diagnose, triage and treat mental health related presentations. Findings from the study have been used in an internal review and redesign of data collection within the CAT team to improve the way suicidal behaviour is recorded upon referral and assessment.
- **Improved identification and recording of suicidal behaviour in records of clients from CAAC with a referral from Alice Springs Hospital.** Our audit study involved a retrospective recoding of discharge summaries received from Alice Springs Hospital involving suicidal behaviour that has provided CAAC with a more accurate record of suicidal behaviour amongst their clients. This methodology could be relevant for other services.

Recommended

- **Training of hospital physicians to improve knowledge and recognition of mental health issues, especially suicidal behaviour.** Some training exists around specific assessment tools, such as SAD PERSONS, but further work is needed around Indigenous specific factors. This training should target emergency department physicians who are often the first to attend to suicidal behaviour in hospitals and hospital staff outside of the mental health wards.
- **Improve ways hospital physicians and mental health staff work together in assessing, diagnosing and treating suicidal behaviour.** This should take into account the whole patient journey for an

episode of hospitalisation, from presentation to discharge, in order to ensure that information relevant to follow-up care is maintained.

- **Consistent recording of suicidal behaviour on discharge summaries.** There may be some under-reporting of suicidal behaviour on discharge summaries from NT hospitals. In order to ensure appropriate follow-up care, all suicidal behaviour found in hospital settings should be recorded on discharge summaries even if it was not the primary condition treated.

Improved follow up of hospital suicidal behaviour

Outcomes achieved within the study

- **Informed and supported development, implementation and evaluation of The Way Back Support Service in the NT.** The Way Back Support Service is the only dedicated service offering follow-up support designed specifically for hospitalised suicidal behaviour in the NT. The findings from this survival analysis and the technical knowledge acquired throughout the study have helped to inform the development, implementation and evaluation of The Way Back. This was achieved formally through Bernard Leckning's membership of the Advisory Group for the project in 2015 and informally since then in meetings with *beyondblue* project staff to discuss findings from the research. Input from the study has helped to identify particular groups of The Way Back Support Service clients and factors that may place these clients at risk of different outcomes. Furthermore, the technical knowledge acquired of health care and data for hospitalised suicidal behaviour has been used to collect the relevant data for evaluation purposes.

Recommended

- **Improvements to hospital discharge processes to better facilitate access to appropriate follow-up care and support.** This requires some further work that identifies available services and programs and which are most appropriate for the different risk groups identified in this study. An exploratory qualitative study undertaken in Alice Springs led to a proposed framework for coordinated data collection and responses to suicidal behaviour in the community (Taylor et al, 2013) that is supported by the findings of this study. Other models may be suitable for remote communities, such as the Adolescent Suicide Prevention Project in West Athabasca, New Mexico (May et al, 2005).
- **Co-ordinated approach to follow-up care at primary health care providers.** DDHS offer a model of a "wrap around" follow-up support service that is integrated into their patient transport program following hospitalisation. This could be complemented by more active follow-up by SEWB services based around improved referrals from hospitals and recording of this information by primary health care providers.
- **Health promotion to reduce stigma around Indigenous suicidal behaviour and improve help-seeking behaviour of clients of primary health care providers, especially Aboriginal Medical Services.** Strategies to raise awareness of suicidal behaviour and reduce stigma are needed for NT Indigenous residents. It appears likely that those most at risk are not seeking support. Barriers to access help in terms of structural, social and cultural factors may need to be overcome in order to help change patterns of help-seeking or to promote acceptance of follow-up support. This could involve a strategy as simple as producing resources for hospital patients and primary health service

clients. Providing sensitively targeted information about available help following suicidal behaviour could help to destigmatise suicidal behaviour and encourage help seeking.

Enhancing capacity to support community-based suicide prevention

Outcomes achieved within the study

- **Improved research skills and knowledge in Indigenous social and emotional wellbeing and suicide prevention at CAAC.** The audit study at CAAC was designed to include a component of professional development for Roxanne Highfold. He had reading material set as well as seminars with the research team on: research into Indigenous suicide in Australia and elsewhere, strategies and policies supporting Indigenous suicide prevention, evidence base describing effective suicide prevention and a primer on research methodology and writing up research.
- **Improved capacity for follow-up at CAAC.** The audit study produced the foundations for improved follow-up at CAAC through more accurate coding of existing records and a framework for identifying suicidal behaviour in client records. These outcomes are relevant for other ACCHOs across the NT and possibly nationally.

Recommended

- **Work with government and Indigenous peak body organisations in the NT and other jurisdictions to disseminate findings.** Findings from this project highlight key factors associated with repeated hospitalised suicidal behaviour and suicide across the NT Indigenous population. This study has filled a major gap in the evidence base: no other research has been able to identify specific risk factors for repeated suicidal behaviour and suicide in the Indigenous population. The relevance and importance of this research as a starting point for preventive efforts and for further research across Australia should not be underestimated. Brief technical reports as well as lay summaries should be produced and disseminated across key government agencies and organisations involved in the follow-up care of Indigenous persons after hospitalisation involving suicidal behaviour to promote awareness of risk factors that are likely to influence client outcomes.
- **Workshop to establish a framework for suicide prevention in the Aboriginal Community Controlled Health Organisation (ACCHO) sector.** ACCHOs are already prioritising the social and emotional needs of clients and this research could form the basis of a workshop to help develop an approach to improved preventive efforts within primary health care. The development of such a framework should be led by the sector in collaboration with research organisations and government.

Further analysis and research

Throughout the study, some limitations in the statistical analyses originally proposed were discovered but were beyond the scope of this project to investigate. Additional analyses that can make better use of the existing data collected in this study are outlined below.

Additional analysis

1. **How do outcomes differ by type of suicidal behaviour?** Including type of suicidal behaviour poses both conceptual and mathematical problems for survival analysis that are not very well handled by the conventional methods originally proposed in this research. An approach called marginal structural analysis can take these issues into account and provide a more accurate estimate of how the risks differ by type of suicidal behaviour.
2. **How do outcomes differ for the Indigenous population by patterns of health service utilisation?** The scope of available data limited the analysis as originally planned. However, a marginal structural approach to survival analysis can be used to estimate differences in outcomes by patterns of health service utilisation even with major gaps in available data.
3. **What is the risk of other causes of death following hospitalised suicidal behaviour?** Conventional approaches to survival analysis can only examine one outcome – in this case, suicide. However, whilst suicide was the leading cause of death in the study cohort, it represents only a small proportion of all deaths found. In these situations, a competing risk approach to survival analysis can estimate the probabilities of suicide as well as other causes of death that are known to be associated with a history of suicidal behaviour, such as accidental deaths and other external causes (Haukka et al, 2008).
4. **What is the effect of subsequent non-fatal suicidal behaviour on the probability of suicide?** The current analysis only tested for the increased likelihood of suicide for each number of subsequent intentional self-harm or suicidal ideation. A number of underlying mathematical assumptions did not hold when comparison by type of suicidal behaviour was attempted. This was because the risk appeared to vary over time quite differently by each type of suicidal behaviour. Answering this question should be feasible using marginal structural models to overcome the limitations of Cox proportional methods (Robins et al, 2000).

Analyses to answer these questions will be included in peer-reviewed publications subject to their results.

Further research

This research has demonstrated the feasibility and utility of administrative data linkage as the basis for producing informative research into suicidal behaviour in the NT. Based on the findings from this study and what has been learned about the availability of relevant administrative data, there are three potential research projects that could be pursued. These are outlined below.

- **Identifying risk factors for suicidal behaviour in the NT.** Whilst this study identifies factors associated with higher risk of suicidal behaviour following hospitalisation, it cannot distinguish whether one group is more or less at risk of suicide compared with others at risk in the community. However, this study demonstrates the feasibility and utility of linking administrative data for suicide prevention research, suggesting that a large scale case-control study comparing suicide deaths in the NT to community controls is feasible. Such a study would provide a more comprehensive picture of factors important in predicting suicide. Ideally, such a study could provide the basis for the long-term monitoring of risk factors influencing suicide and for the evaluation of policies designed to reduce risk of suicide.
- **Evaluation of follow-up care for hospitalised suicidal behaviour.** The analysis of linked administrative data can also be used to estimate the effects of large-scale treatments and policies

regarding suicide. Should any strategies or programs be put in place across the Territory to improve follow-up care, techniques of data linkage available in the NT could be used to collect data and to analyse any effects of such interventions over time.

- **Prospective follow-up study of emergency department presentations involving suicidal behaviour.** Not all presentations to hospitals involving suicidal behaviour lead to an admission. Other research has shown the risks associated with emergency department presentations involving suicidal behaviour are different and can be higher compared to those who are admitted (Crandall et al, 2006). Further investigation of these differences in light of the current study's findings may add to capacity to target preventive follow-up care and support in cases not leading to admission.

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Appendix A Study Methodology

This study was approved by the Human Research Ethics Committee of Northern Territory Department of Health and Menzies School of Health Research (Reference: 2013-1992), the Central Australian Human Research Ethics Committee (Reference: 13-150) and the Australian Institute of Health and Welfare Ethics Committee (Reference: 2013-3-31).

Subsequent to ethics submission, the proposed research went through a number of review processes within partner organisations to ensure the details in the design and approach to the study adhered to local principles, policies and procedures for research collaboration and translation. In sum, the full study had to receive approval from the NT Department of Health's Data Governance Unit before we could approach the individual data custodians for access to the data described below. Similarly, both CAAC and DDHS have internal review processes to approve any research involving the organisation and their clients. These processes provided valuable feedback into the research design and methodology and ensured the project was well supported in each of the organisations.

Based on these and other initial discussions between investigators and key stakeholders, the study was organised around 3 stages, as outlined below.

Stage 1: Outcomes following hospitalisation involving suicidal behaviour

After initial discussions highlighted the lack of standard and consistent recording of suicidal behaviour in the administrative records of emergency department presentations, Stage 1 was further organised around 2 components. Stage 1a was a small scale study incorporated into the project to ensure we had some understanding of suicidal behaviour in emergency departments given the quality of data in the administrative records for these presentations could not support the scale of the study we originally proposed. It was also an opportunity to look closely at practices involved in the production of the hospital and mental health records to ensure analyses involving this data could be appropriately interpreted as findings. We worked closely with the emergency department and mental health staff that respond to these presentations in the design of the study and interpretation of the findings. Stage 1b corresponds to the original follow up study of outcomes restricted to admitted patients only.

Stage 1a: Exploratory study of suicidal behaviour in NT emergency departments, 2013

Aim: To identify the characteristics of emergency department presentations in the NT involving suicidal behaviour and their outcomes. Selection criteria: All consecutive presentations to Royal Darwin and Alice Springs Hospitals between August and October 2013 requiring a mental health assessment. Royal Darwin (RDH) and Alice Springs Hospitals (ASH) are the two major public hospitals of the NT with emergency departments. The majority of hospital episodes of care involving suicidal behaviour originate from within these emergency departments, as either walk in presentations or admissions pre-arranged with the NT Mental Health CAT team. Current hospital protocol requires a mental health assessment for all presentations involving or deemed at risk of suicidal behaviour. These are recorded as referrals in the mental health administrative records. In order to identify suicidal behaviour in emergency department presentations and provide a meaningful comparison group, all referrals to NT Mental Health from RDH and ASH were included in this study.

Data collection: Audit of hospital and mental health administrative records associated with selected presentations and mental health records for the 12 months prior. An audit protocol was designed to guide a research assistant who would review all mental health referrals and enter data collected into a spreadsheet for analysis. The data was de-identified once verified after data entry.

Measures: Primary outcome measures were discharge outcomes from the hospital records and referral outcomes from the mental health records for all presentations involving suicidal behaviour. Socio-demographic details were obtained from the hospital records for all mental health referrals included in the study. For presentations involving suicidal behaviour, secondary measures obtained from hospital records were the type of suicidal behaviour and mental health history, comorbidities at the time of presentation and information on life stressors were obtained from mental health records.

Analysis: Descriptive summary of the socio-demographic characteristics of all mental health referrals reviewed during the study period. Descriptive summary of all presentations involving suicidal behaviour by outcome and secondary measures were produced and bivariate statistics calculated to identify any differences in outcomes and secondary measures. All analyses were conducted using Stata version 14.

Dissemination and research translation: Report with detailed findings for NT Department of Health. Discussions with NT Mental Health branch around data quality issues and implications for assessment and triage. Discussing options for discharge and referral practices. Peer reviewed publication to be drafted. Summary report to be made publicly available and distributed to mental health organisations in the NT.

Stage 1b: Outcomes following hospitalisation involving suicidal behaviour in the NT.

This is one of the main components of the project and has been outline in the Approach section. This appendix will provide additional methodological details.

Aim: Identify factors associated with further suicidal behaviour following hospitalisation involving suicidal ideation and intentional self-harm in the NT.

Selection criteria: All individuals with an admission at an NT public hospital containing a diagnosis of suicidal ideation or intentional self-harm between 2001 and 2013, inclusive. All individuals were excluded if they also had a hospital separation with one of these diagnoses in the 2 years prior to the study period (i.e. 1999 to 2000, inclusive). Individuals were identified using the unique identifier for all health records in the NT, the Hospital Reference Number or HRN.

Data collection: 1. All hospital separation records for the individuals selected for the study were extracted and de-identified. The HRN for each individual was encrypted and used as the study identifier. In order to facilitate linkage to other health datasets (see Stage 2) that use HRN to identify individuals, an independent team at the NT Health Gains Planning Branch maintained a confidential file mapping the study identifier back to the original HRN for all participants (Master Linkage File).

2. Linkage to the National Death Index (NDI), the NT Births, Deaths and Marriages (BDM) Registry and hospital records to obtain mortality records. Linkage to the NDI was undertaken to ensure we captured deaths from other jurisdictions and would not be found with NT registered deaths in the BDM and hospital records. Linkage to BDM and other hospital records was facilitated by using the Master Linkage File to identify study participants in these datasets via HRN. The results of these linkages were triangulated to validate mortality outcomes.

Measures: Primary outcome measures were the dates of subsequent hospitalisation involving suicidal ideation and intentional self-harm and mortality, especially death by suicide. Independent measures are those variables by which the outcomes are expected to differ. The analyses presented here used socio-demographic characteristics and comorbid conditions identified in other diagnosis codes recorded in the initial hospitalisation involving suicidal behaviour that triggered inclusion in the study. Cause of death in the mortality records was coded using ICD-10 standards for cause of death codes.

Analysis: Descriptive and trend analyses were used to understand the distribution of outcomes by socio-demographic characteristics and type of suicidal behaviour. Survival analyses were used to identify any statistically significant differences across the independent measures above for each of the primary outcome measures: subsequent suicidal ideation, subsequent intentional self-harm and suicide.

Multivariate Cox proportional hazards regression was used to estimate the hazard functions and ratio in instantaneous hazard rates (including 95% confidence intervals) across each of the independent measures. All analyses were conducted using the estimation methods implemented in Stata version 14.

Dissemination and research translation: See main body of this report.

Stage 2: Identifying patterns of health service usage for Indigenous patients with hospitalisations involving suicidal behaviour in the NT

This is one of the main components of the project and has been outlined in the Approach section. This appendix will provide additional methodological details.

Aim: Identify patterns of primary and mental health care service usage for Indigenous patients with hospitalisations involving suicidal behaviour in the NT. In describing patterns of service usage associated with different outcomes, this component of the research is designed to facilitate discussions about opportunities for prevention within existing service delivery and, where necessary, what additional programs and support are needed to reach those most at risk.

Selection criteria: All Indigenous individuals with an admission at an NT public hospital containing a diagnosis of suicidal ideation or intentional self-harm between 2001 and 2013, inclusive. This is simply the Indigenous subset of the study cohort defined above in the Master Linkage File.

Data collection: 1. All contacts with NT Mental Health Branch and NT Remote Health branch services between 2010 and 2015. The HRN of all participants were used to link to and extract data from administrative records on participant contacts with any of the services and programs run by the NT Mental Health Branch. Similarly, the HRN of participants was used in a separate linkage to extract administrative data on contacts with any of the primary health services run by the NT remote Health Branch. This linkage produced de-identified service event data with the study identifier replacing the HRN for each individual record.

2. All contacts with participating Aboriginal Medical Services – CAAC and DDHS. Given HRN is not the primary identifier used by AMSs in the NT, a linkage process had to be designed in collaboration with participating AMSs and Health Connex, the developer of the patient management software,

Communicare,⁷ which is used by these and other AMSs across Australia. A deterministic approach to linkage was decided upon. An algorithm was developed that used different combinations of HRN, date of birth, name and sex to match participants to clients at each of the AMSs. A process was designed and implemented around this algorithm as follows:

1. An Audit script containing the algorithm was run using the Communicare software at each AMS that would attempt to identify study participants as clients. The script would output the data supplied to the script describing the participant (including the study identifier) and the data obtained from Communicare on the best match.
2. A research assistant with no contact with any other components of the study would review the audit output to confirm or reject the matches. Some manual searching and review of patient records in Communicare was used for ambiguous matches.
3. The confirmed matches from the audit script and review process were input into the Encounter script to extract service events for each client.
4. The AMS service event data was validated and de-identified by our research assistant - all personal identifiers used in the linkage process were removed leaving only the study identifier and anonymous service event data.
5. The de-identified data was linked to the research dataset for analysis using the study identifier.

Historical data at CAAC was available from 2005 to 2015 and the historical data from DDHS was gathered from 2010 to 2015.

Measures: The primary outcome measures are as above in Stage 1b – subsequent hospitalisation involving suicidal ideation and intentional self-harm and mortality, especially by suicide. A flag indicating whether or not a participant had at least one contact with each of the services described was used as independent measures. Diagnostic data from the services was also used as an independent measure.

Analysis: Descriptive analyses to summarise and understand the differences in the characteristics and outcomes of participants with and without service events and different diagnoses. All analyses were conducted using Stata version 14.

Dissemination and research translation: See main body of this report.

Stage 3: Research translation and capacity building activities

Processes for the dissemination and discussion of findings were established with key stakeholders including partners and other relevant organisations across the NT that have an interest and work within suicide prevention and mental health.

Although each organisation had certain interests and roles within the study, a broad outline of our process of stakeholder engagement is provided below:

⁷ See the Communicare website for more details on the software and its uses:
<http://healthconnex.com.au/solution/communicare>

1. **Discussion of the main research questions (Stages 1 to 3) and what participating in the research (where applicable) would involve.** Some further discussions were often needed to identify what specific resources would need to be committed by all parties involved.
2. **Outline process of engagement and research translation.** With each stakeholder we would agree to a set of meetings and staff that would be involved in the different stages of the research.
3. **Formalise collaboration in a research partnership.** Most organisations who provided us with data required an agreement to be signed to formalise our commitment to the study and its outcomes.
4. **Identification of specific research questions.** This involved discussions with key staff about particular issues they had related to their services or programs and how this study could provide some answers.
5. **Progress meetings and discussions.** As results were produced, meetings were organised with relevant stakeholders to discuss the findings and implications.
6. **Final presentation of results, findings and recommendations.** In most cases this will take the form of a report documenting the results and discussion of specific research questions established with each organisation.

In addition to the above, we worked with CAAC to develop a small scale study in Alice Springs that was also designed to enhance their existing capacity for suicide prevention (see Appendix F).

The table below outlines the key stakeholders that have been involved in this process.

Organisation	Person/Role
NT Mental Health Branch	Director
	Suicide Prevention Coordinator
	Indigenous Suicide Prevention Coordinator
	Chief Psychiatrist
	Manager, CAT team (Top End and Central Australia)
	Team Leader, CAT team (Top End and Central Australia)
	Dr Rob Parker, Psychiatric Registrar (Top End)
	Dr Marcus Tabart, Psychiatric Registrar (Central Australia)
	Manager, Data and Reporting
	Information Analysts
NT Remote Health Branch	General Managers, Primary Health Care
	Manager, Data and Reporting
	Information Analysts
Royal Darwin Hospital	Dr Didier Palmer, Director of Emergency Medicine
Alice Springs Hospital	Dr Stephen Gourley, Director of Emergency Medicine
Aboriginal Medical Services Alliance of the Northern Territory (AMSANT)	CEO, John Paterson
	Public Health Officer
	Policy Advisers
	Members of Public Health Advisory Group
Central Australian Aboriginal Congress, Alice Springs	CEO, Donna Ah Chee
	CMO, Dr John Boffa
	Research Advisory Committee
	Research Coordinator
	CQI Officer and Data Analyst
	Roxanne Highbrow, Research Officer
	Manager, SEWB programs

Organisation	Person/Role
Danila Dilba Health Service, Darwin and Palmerston	CEO, Olga Havnen CMO, Sarah Giles Coordinated Care Team Communicare Manager
Wurli Wurlinjang Health Service⁸, Katherine	CEO, Dr Marion Scrymgour Manager, SEWB programs

⁸ Wurli Wurlinjang had informally agreed to take part in the research and initial meetings were held to discuss the study and questions that may be relevant to local practices and issues. However, with a shift in personnel Wurli no longer had the resources to support the study and we agreed to re-engage at a later point in time when we could once again work together.

Appendix B Exploratory study of NT Emergency Department presentations with suicidal behaviour, 2013

The text below is the current draft of an abstract from an as yet unpublished manuscript discussing some findings from this small exploratory study. Some additional multivariate analyses will be undertaken and the draft will be revised accordingly before being published in a peer-reviewed academic journal.

Objective: To make use of hospital and mental health administrative data to understand the characteristics and outcomes of ED presentations involving suicidal behaviour to the two major public hospitals in the Northern Territory.

Methods: A record audit methodology was used to collect data and identify suicidal behaviour in consecutive mental health-related presentations to the ED of Royal Darwin and Alice Springs Hospitals over a two-month period in 2013. Frequencies and bivariate statistics were calculated to describe the characteristics of these presentations and identify significant differences by socio-demographics, type of suicidal behaviour, mental health history and patient discharge outcomes.

Results: Of 261 consecutive mental health-related presentations reviewed, 167 involved suicidal behaviour, mostly identified as suicidal ideation, plans and/or threats. Most presentations occurred at Royal Darwin Hospital (72.5%), were male (56.9%), non-Indigenous (67.1%), under 35 years of age (61.7%) and resided in urban areas (79.6%). Non-Indigenous females were most associated with self-poisoning and having a psychiatric diagnosis. Referrals to mental health services were associated with urban non-Indigenous presentations and hospital admission was most common among males and intentional self-harm presentations.

Conclusions: There were notable differences by Indigenous status and sex in ED presentations involving suicidal behaviour. Differences in the records of mental health history indicate the challenges and barriers facing the assessment and treatment of Indigenous presentations. Admission possibly reflects higher risk of subsequent suicidal behaviour. Overall, the role of emergency departments and the use of administrative data cannot be underestimated in developing evidence-based responses to suicidal behaviour.

Keywords: suicidal behaviour; suicide; prevention; Indigenous; Northern Territory.

Appendix C Detailed summary of mortality outcomes following hospitalised suicidal behaviour in the NT

Number and percentage of deaths in study cohort by key underlying causes of death, 2001-2015

Underlying cause of death	n	%
Suicide	79	1.8%
Transport accidents	20	0.4%
Accidental poisoning	15	0.3%
Assault	13	0.3%
Other external causes	11	0.2%
Total external causes	138	3.1%
Malignant neoplasms	38	0.8%
Ischaemic heart disease	14	0.3%
Other diseases of circulatory system	19	0.4%
Total	33	0.7%
No COD	16	0.4%
Disease of respiratory system	14	0.3%
Diabetes mellitus	12	0.3%
Disease of nervous system	7	0.2%
Other causes	34	0.8%
Alive	4,171	93.0%
Total	4,486	100.0%

Top 50% underlying cause of death codes in study cohort, 2001-2015

Underlying cause of death code and description	n	%
X70 Intentional self-harm by hanging, strangulation and suffocation	65	21.74
K70 Alcoholic liver disease	15	5.02
I25 Chronic ischaemic heart disease	11	3.68
J44 Other chronic obstructive pulmonary disease	10	3.34
X44 Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances	9	3.01
C34 Malignant neoplasm of bronchus and lung	8	2.68
E11 Type 2 diabetes mellitus	7	2.34
V03 Pedestrian injured in collision with car, pick-up truck or van	6	2.01
I51 Complications and ill-defined descriptions of heart disease	5	1.67
X99 Assault by sharp object	5	1.67
E14 Unspecified diabetes mellitus	4	1.34
G40 Epilepsy	4	1.34

Appendix E Audit of discharge summaries received by CAAC from Alice Springs Hospital, 2015

Confidential report supplied separately to beyondblue.