



# **2015 Report on Suicide Mortality in the Canadian Armed Forces (1995 to 2014)**

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# 2015 Report on Suicide Mortality in the Canadian Armed Forces (1995 to 2014)

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### Abstract

**Introduction:** The Directorate of Force Health Protection (DFHP) regularly conducts analyses to examine suicide rates and the relationship between suicide and deployment. This report is an update covering the period from 1995 to 2014.

**Methods:** This report describes crude suicide rates from 1995 to 2014, comparisons between the Canadian population and the CAF using standardized mortality ratios (SMRs), and suicide rates by deployment history using SMRs and direct standardization. It also examines variation in suicide rate by Command and, using data from the Medical Professional Technical Suicide Reviews (MPTSR), looks at the prevalence of other suicide risk factors in suicides which occurred in 2014.

**Results:** Between 1995 and 2014, there were no statistically significant increases in suicide rates. The number of Regular Force male suicides was not statistically different than that expected based on Canadian male suicide rates. While the male suicide rate among previously deployed personnel was not significantly higher than in comparable civilians, rate ratios indicated that there was a trend for those with a history of deployment to be at an increased risk of suicide compared to those who have never been deployed; however the difference was not statistically significant. These rate ratios also highlighted that being part of the Army Command increases the risk of suicide, relative to those who are part of the other Commands.

While past analyses had not shown an association between having been deployed and completed suicide, the most recent findings suggest a trend towards an elevated suicide rate ratio (1.48, CI: 0.98, 2.22) in the past decade in those Regular Force males with a history of deployment relative to those Regular Force males without a history of deployment. However, this finding fell just short of statistical significance. Regular Force males under Army Command were at significantly increased risk of suicide relative to Regular Force males under non-Army Commands (age-adjusted suicide rate ratio = 2.02, CI: 1.45, 2.61), with a trend towards a widening gap between the rates in Army and non-Army Command Regular Force males over the past five years. However, this appeared to be driven by lower than expected rates of suicide in Regular Force males under non-Army Commands relative to civilians rather than a significant rise in rates in Regular Force males under Army Command as these were similar to the suicide rates in civilians (SMR = 1.08, CI: 0.81, 1.41). Regular Force males under Army Command in the combat arms trades had statistically significantly higher suicide rates (30.35/100,000, CI: 23.03, 39.69) than non-combat arms Regular Force males (18.21/100,000, CI: 14.75, 22.54).

Results from the 2014 MPTSRs support the theory of a multifactorial causal pathway to suicide rather than a direct link between single risk factors (e.g. PTSD or deployment) and suicide.

**Conclusions:** Suicide rates in the CAF did not significantly increase over time, and after age standardization, they were not statistically higher than those in the Canadian population. However, small numbers have limited the ability to detect statistical significance. In contrast to previous results, history of deployment may be emerging as a risk factor for suicide in the CAF. The increased risk in Regular Force males under Army Command compared to Regular Force males under non-Army Command is another new finding. Deployment-related trauma (especially that related to the mission in Afghanistan) and resulting mental disorders are plausible mechanisms for these associations. However, residual confounding may also be at play (e.g., by disproportionate risk of childhood trauma or other lifetime trauma in Army personnel or those who deploy). Further research with other data sources will be needed to explore these hypotheses in depth.

*suicide; Canadian Forces; rates; age-adjusted rate; standardized mortality ratio; rate ratio; deployment; Canadian population*



### Résumé

**Introduction :** La Direction - Protection de la santé de la Force (DPSF) mène régulièrement des analyses afin d'examiner les taux de suicide et la relation entre le suicide et le déploiement. Le présent rapport constitue une mise à jour pour la période s'échelonnant de 1995 à 2014.

**Méthodes :** Le présent rapport décrit les taux bruts de suicide de 1995 à 2014, les comparaisons entre la population canadienne et les FAC au moyen des ratios standardisés de mortalité (RSM) et les taux de suicide chez les personnes ayant des antécédents de déploiement au moyen des RSM et de la normalisation directe. Il examine également la variation dans le taux de suicide en fonction du commandement et, au moyen de données tirées des Examens techniques des suicides par des professionnels de la santé (ETSPS), on s'est penché sur la prévalence d'autres facteurs de risque dans les suicides qui ont eu lieu en 2014.

**Résultats :** Entre 1995 et 2014, il n'y avait pas d'augmentation statistiquement significative des taux de suicide. Le nombre de suicides chez les hommes de la Force régulière n'était pas statistiquement différent du taux prévu en fonction des taux de suicide chez les hommes dans la population canadienne. Bien que le taux de suicide chez le personnel ayant fait l'objet d'un déploiement ne soit pas beaucoup plus élevé que chez la population civile comparable, les ratios de taux indiquaient que ceux qui ont des antécédents de déploiement présentaient une tendance statistiquement non significative de risque accru comparativement à ceux qui n'ont jamais fait partie d'un déploiement. Ces ratios de taux laissent aussi voir que le fait de faire partie du commandement de l'Armée de terre accroît le risque de suicide par rapport à ceux qui font partie d'un autre commandement. Bien que des constatations antérieures des FAC n'aient pas montré d'association entre le fait d'avoir été déployé et le suicide, les constatations les plus récentes laissent maintenant voir une tendance vers un ratio de taux de suicide ajusté élevé (1,48, IC : 0,98, 2,22) au cours de la dernière décennie chez ceux qui avaient des antécédents de déploiement comparativement à ceux qui n'en avaient pas. Toutefois, cette conclusion ne représentait pas tout à fait une importance sur le plan statistique. Le personnel de l'Armée de terre présentait un risque de suicide nettement accru par rapport aux autres militaires (ratio de taux de suicide ajusté en fonction de l'âge = 2,02, IC : 1,45, 2,61), et on note une tendance vers un élargissement de l'écart entre les taux du personnel de l'Armée de terre et ceux des autres militaires au cours des cinq dernières années. Cependant, cela semble être dû aux taux inférieurs à ce qui était prévu chez les militaires n'appartenant pas à l'Armée de terre comparativement aux civils, plutôt qu'à des taux élevés chez le personnel de l'Armée de terre (RSM = 1,08, IC : 0,81, 1,41). Le personnel mâle de l'Armée de terre faisant partie des métiers d'armes de combat présente des taux de suicide nettement plus élevés (30,35/100 000, IC : 23,03, 39,69) que ceux des autres membres de l'Armée de terre ne faisant pas partie des métiers d'armes de combat (18,40/100 000, IC : 14,75, 22,54). Les résultats des ETSPS de 2014 appuient la théorie d'un enchaînement de causalité qui est plus multifactoriel plutôt qu'un lien direct entre des facteurs de risques individuels (p. ex. l'ESPT ou le déploiement) et le suicide.

**Conclusions :** Les taux de suicide dans les FAC n'ont pas augmenté de façon marquée avec le temps, et ils ne sont pas plus élevés que ceux de la population canadienne lorsqu'ils sont normalisés selon l'âge. Toutefois, le nombre peu élevé de sujets pourrait avoir restreint la capacité à détecter une signification statistique. Comparativement aux résultats antérieurs, les antécédents de déploiement émergent désormais comme un facteur possible de risque de suicide dans les FAC. Le risque excessif au sein de l'Armée de terre est également une constatation nouvelle. Le trauma lié au déploiement (particulièrement celui lié à la mission en Afghanistan) et les troubles mentaux qui en découlent sont des mécanismes plausibles de ces associations. Cependant, un effet de confusion résiduel pourrait aussi entrer en jeu (p. ex., un risque disproportionnel provenant d'un traumatisme de l'enfance ou d'un autre traumatisme vécu chez le personnel de l'Armée de terre ou chez ceux qui sont déployés) d'autres recherches seront nécessaires pour étudier ces hypothèses en profondeur.

*suicide; taux; taux ajustés selon l'âge; ratios standardisés de mortalité; ratios des taux; déploiement; population canadienne*



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### **Report Introduction**

Historically, reports on suicide produced by the Epidemiology cell of the Directorate of Force Health Protection have focused on the surveillance and epidemiology of suicide within the Canadian Armed Forces (CAF). This report, for the first time, expands its scope to describe the larger body of evidence related to suicide in the Canadian Armed Forces, and to describe its evolution over the last 20 years (Chapter 1).

Also, for the first time, the epidemiological report will be supplemented with more in-depth information on the mechanisms and underlying risk factors that may have contributed to the Regular Force male suicides that took place in 2014 based on an assessment of the Medical Professional Technical Suicide Reviews (MPTSRs) (Chapter 2). Finally, this report also provides a more in-depth analysis of the variation of suicide rates by Command (Chapter 3).

In the past, the subject matter captured in Chapters 2 and 3 have been reported on in separate reports; by combining these three reports into one larger report, this allows for the streamlining of all available evidence into one, easily accessible and complete source of information on suicide mortality in the CAF.



## Chapter 1 – The Epidemiology of Suicide in the Canadian Armed Forces, 1995-2014

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### 1.1 Introduction

There has been concern expressed since the early 1990s about the apparent rate of suicide in the CAF and its possible relationship to deployment.<sup>1</sup> In response to these concerns, the CAF began an active suicide mortality surveillance program to determine the rate of suicide among CAF personnel overall in comparison to the Canadian population as well as the rate of suicide in those personnel with a history of deployment compared to those without such a history.

Understanding suicide rates in the CAF requires careful comparison to general population rates and trends. Although DND keeps a current record of CAF suicides, comparisons with the general Canadian population are dependent on the releases of Canadian mortality rates by Statistics Canada approximately 4 years after the end of their data collection. Currently CAF suicide data are available until 2014; however, the most recent Canadian data available are for 2011.

The Directorate of Force Health Protection provides, on a regular basis, epidemiological reports that include CAF suicide rates over time, comparisons to the general population, and suicide analyses according to deployment history. This report, as with previous ones, only includes Regular Force suicides as Reserve Force records are incomplete for both suicide events and information on the size and characteristics of the Reserve Force, both of which are needed to calculate reliable suicide rates. There is a high turnover for Class A Reservists and suicides among this group may not be brought to the attention of DND because they are primarily reported and investigated in the civilian sector. The true number at risk is also uncertain; this problem is exacerbated by the fact that what defines a Reservist as “active” remains unclear. Similarly, suicide deaths among Cadets, Rangers and Supplemental Reservists are not able to be reliably tracked. Since data on suicide attempts are often incomplete, in keeping with other occupational health studies, this report only includes completed suicides. The data used for this analysis include only those who have died of suicide while active in the Regular Forces and do not include those who have died of suicide after leaving the military; the latter are covered by the CF Cancer and Mortality Study.

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<sup>1</sup> Wong A, Escobar M, Lesage A, Loyer M, Vanier C, Sakinofsky I. Are UN peacekeepers at risk for suicide? *Suicide and Life-Threatening Behavior*. 2001;31:103-12.



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### 1.2 Methods

The CAF uses intentionally redundant methods to ensure that all cases of suicide in Regular Force personnel are identified. Information on the number of suicides and demographic information was obtained from the Directorate of Casualty Support Management (DCSM) up to 2012. As of September 2012, the number of suicides was tracked and provided by the Directorate of Mental Health (DMH). DMH also cross-references their numbers with those collected by 4 Note that suicide death investigations often take several months; as a result the investigations into suicides in the previous year were not all complete at the time of the initial release of this report.

Information on deployment history and CAF population data (by age, sex and deployment history) originated from the Directorate of Human Resources Information Management (DHRIM). History of deployment was based on department IDs and deployment units from DHRIM. It should be noted that the number of personnel with a history of deployment occasionally changes from previous reports due to updating of DHRIM records.

Canadian suicide counts by age and sex were obtained from Statistics Canada. Data were available up to 2011 at the time of preparation of this report. Canadian suicide rates are derived from death certificate data. Codes utilized for this report were ICD-9 E950-E959 (suicide and self-inflicted injury) in the Shelf Tables produced by Statistics Canada from 1995 to 1999. For 2000 to 2008 the number of suicide deaths was based on ICD-10 codes X60-84 and Y87.0 utilizing CANSIM Table 102-0540 from Statistics Canada, for 2009 to 2011 suicide deaths CANSIM Table 102-0551 was the source. Open verdict cases (ICD-9: E980-E989; ICD-10: Y30-Y34) are excluded by Statistics Canada, although they are routinely included in suicide statistics reported elsewhere (e.g. UK – both in civilian and military contexts). To ensure valid comparisons, the Statistics Canada exclusions were followed for these analyses. All Canadian population denominators were taken from Statistics Canada CANSIM Table 051-0001. Denominators up to and including 2010 were final intercensal estimates, while 2011 was based on final post-censal estimates. There is some evidence that death certificate data underestimate suicide rates although the true rate is probably no more than 1.25 times the official rate (CDC National Center for Injury Prevention and Control estimate). However, there is no evidence suggesting that military personnel or veterans are more likely to have under-ascertainment of suicide on death certificates relative to other Canadians.

Canadian rates for suicide in females are typically 1/3 to 1/5 of those for males. In conjunction with the low proportion of females in the CAF, it is not unusual to have very few or no female suicides in the CAF on an annual basis. Due to the very low number of female suicides and instability of this data statistically, comparisons to the Canadian suicide rates were made with male rates alone. Crude CAF Regular Force male suicide rates were calculated from 1995 to 2014. Suicide rates prior to 1995 have not been calculated as the historical method of ascertainment of suicides within the CAF is not well defined.

To compare CAF Regular Force male rates with general Canadian male population rates, standardization by age using the indirect method was used to provide standardized mortality ratios (SMRs) for suicide up to 2011. This method controls for the difference in age distribution between the CAF Regular Force male and general Canadian male populations. An SMR is the observed number of cases divided by the number of cases that would be expected in the population at risk based on the age and sex-specific rates of a standard population (the Canadian population in this case) expressed as a percentage. Therefore, an SMR less than 100% indicates that the population in question has a lower rate than the Canadian population, while an SMR greater than 100% indicates a higher rate.



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The calculation of confidence intervals for population-based data is controversial but is provided here for those who may want to generalize the results to other years. Confidence intervals (CIs) were calculated for CAF Regular Force male suicide rates and SMRs directly using Poisson distribution 95% confidence limits using the exact method described by Breslow and Day.<sup>2</sup> In any case, CIs are valuable in illustrating the expected random variability that is possible when dealing with numbers of cases that are small in epidemiologic terms. SMR confidence intervals that include 100% are not statistically significant.

SMRs were calculated separately for those Regular Force males with and without a history of deployment. However, SMRs cannot be compared directly to each other as they are standardized to different population distributions.

To compare suicide risk among those Regular Force males with a history of deployment directly to those without, direct standardization was done using the total Regular Force male population of the CAF as the standard. Age-adjusted suicide rates for those Regular Force males with and without a history of deployment were compared using rate ratios. However, since age-specific rates for this population are extremely unstable (as they are based on small numbers and are therefore prone to variation), caution should be used when comparing directly standardized rates. Confidence intervals were calculated using the method described in the text by Rothman and Greenland.<sup>3</sup>

### 1.3 Results

#### A. Crude CAF Regular Force Male Suicide Rates (1995 – 2014)

Table 1.1 shows the CAF rate for suicide per 100,000 for Regular Force males. As the number of events was less than 20 in most years, rates were not calculated annually as these would not have been statistically reliable. Therefore five-year rates have been calculated for 1995 to 1999, 2000 to 2004, 2005 to 2009, and 2010 to 2014. Regular Force female rates were not calculated as female suicides were uncommon; there were no suicides in females from 1995 to 2002, 2 in 2003, no suicides in females in 2004 and 2005, one per year from 2006 to 2008, 2 in 2009, none in 2010, 1 in 2011, 3 in 2012, 1 in 2013, and 1 in 2014.

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<sup>2</sup> Breslow NE, Day NE. *Statistical Methods in Cancer Research: Volume II-The Design and Analysis of Cohort Studies*. Lyon: International Agency for Research on Cancer, 1987.

<sup>3</sup> Rothman KJ, Greenland S. *Modern Epidemiology* 2<sup>nd</sup> Edition, Lippincott, Williams, & Wilkins, Philadelphia, 1998, p.260-4.



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Table 1.1: CAF Regular Force Male Multiyear Suicide Rates (1995-2014)<sup>a</sup>

Year	Number of CAF Regular Force Male Person-Years <sup>4</sup>	Number of CAF Regular Force Male Suicides	CAF Regular Force Male Suicide Rate per 10 <sup>5</sup> (95% CI)
1995	62 255	12	
1996	57 323	8	
1997	54 982	13	
1998	54 284	13	
1999	52 689	10	
<b>1995-99</b>	<b>281 533</b>	<b>56</b>	<b>19.9 (15.1-26.0)</b>
2000	51 537	12	
2001	51 029	10	
2002	52 747	9	
2003	54 137	9	
2004	53 873	10	
<b>2000-04</b>	<b>263 323</b>	<b>50</b>	<b>19.0 (14.1-25.1)</b>
2005	53 648	10	
2006	54 301	7	
2007	55 140	9	
2008	55 704	13	
2009	56 813	12	
<b>2005-09</b>	<b>275 606</b>	<b>51</b>	<b>18.5 (13.8-24.4)</b>
2010	58 723	12	
2011	58 622	21	
2012	58 135	10	
2013	57 687	9	
2014	56 699	16	
<b>2010-14</b>	<b>289 866</b>	<b>68</b>	<b>23.5 (18.4-29.9)</b>

<sup>a</sup> The number of confirmed suicides for CAF Regular Force males for 2009 increased by one since the “Suicide in the Canadian Forces 1995 to 2012” report.

As can be seen in Table 1.1, CAF Regular Force male suicide rates have not appreciably changed between 1995 and 2009. While they appear to have increased somewhat in the last five years, the confidence intervals for all time periods, including 2010 to 2014, overlap, indicating that this increase is not statistically significant. This increase is largely due to the number of suicides being atypically high in 2011. Note that PYs refers to person-years.<sup>4</sup>

<sup>4</sup> Person time is defined as “a measurement combining person and time as the denominator in incidence and mortality rates when, for varying periods, individual subjects are at risk of developing disease or dying. It is the sum of the periods of time at risk for each of the subjects. **The most widely used measure is person-years,**” (emphasis added) (*A Dictionary of Epidemiology*. M Porta, Greenland S, Last JM, eds. Fifth Edition. New York (USA): Oxford UP, 2008.)



**B. Comparison of CAF Regular Force Male Suicide Rates to Canadian Rates using Standardized Mortality Ratios (1995 – 2011)**

As the CAF Regular Force male rates are statistically unstable due to low numbers, the best approach is to compare suicide mortality by estimating the number of cases expected assuming Canadian rates applied to the military population. This method, known as indirect standardization, is used commonly in occupational studies. By dividing the number of observed Regular Force male cases by those expected (using Canadian rates), the standardized mortality ratio (SMR) can be calculated. This does limit calculations to include only those up to 2011 as Statistics Canada has only released suicide rates up to that year at present. Five-year and ten-year comparisons were calculated where possible as ten-year rates have narrower confidence intervals (Table 1.2).

**Table 1.2: Comparison of CAF Regular Force Male Suicide Rates to Canadian Male Rates using Standardized Mortality Ratios (SMRs): 1995-2011<sup>a</sup>**

Year	Age	Number of CAF Regular Force Male Person-Years (PYs)	Canadian Male Suicide Rate	Expected # of CAF Regular Force Male Suicides	Observed # of CAF Regular Force Male Suicides	SMR for Suicide (95% Confidence Intervals)
<b>1995-1999 (5 Yr)</b>	15-19	4 056	19.36	0.79	2	
	20-24	26 521	26.81	7.11	7	
	25-29	52 268	25.28	13.22	14	
	30-34	72 904	27.61	20.13	17	
	35-39	64 964	29.40	19.10	10	
	40-44	33 881	29.44	9.97	3	
	45-49	18 769	28.12	5.28	3	
	50-54	7 766	26.83	2.08	0	
	55-59	404	23.92	0.10	0	
	<b>Total</b>				<b>77.77</b>	<b>56</b>
<b>2000-2004 (5 Yr)</b>	15-19	5 875	14.87	0.87	1	
	20-24	28 433	21.70	6.17	6	
	25-29	36 274	20.56	7.46	9	
	30-34	48 996	22.48	11.01	8	
	35-39	65 618	25.34	16.63	10	
	40-44	47 569	26.08	12.41	10	
	45-49	20 602	26.77	5.51	5	
	50-54	9 256	26.20	2.42	1	
	55-59	700	23.05	0.16	0	
	<b>Total</b>				<b>62.65</b>	<b>50</b>



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Year	Age	Number of CAF Regular Force Male Person-Years (PYs)	Canadian Male Suicide Rate	Expected # of CAF Regular Force Male Suicides	Observed # of CAF Regular Force Male Suicides	SMR for Suicide (95% Confidence Intervals)
<b>1995-2004 (10Yr)</b>	15-19	9 931	17.07	1.69	3	
	20-24	54 954	24.17	13.28	13	
	25-29	88 542	22.94	20.31	23	
	30-34	121 900	25.18	30.70	25	
	35-39	130 582	27.40	35.77	20	
	40-44	81 450	27.67	22.54	13	
	45-49	39 371	27.40	10.79	8	
	50-54	17 022	26.49	4.51	1	
	55-59	1 104	23.43	0.26	0	
	<b>Total</b>				<b>139.85</b>	<b>106</b>
<b>2005-2009 (5 Yr)</b>	15-19	7 412	11.84	0.88	0	
	20-24	39 045	18.82	7.35	10	
	25-29	45 551	17.61	8.02	7	
	30-34	41 004	18.58	7.62	6	
	35-39	47 669	22.29	10.63	11	
	40-44	50 000	25.51	12.75	13	
	45-49	31 281	26.58	8.31	3	
	50-54	11 897	25.27	3.01	1	
	55-59	1 747	23.23	0.41	0	
	<b>Total</b>				<b>58.97</b>	<b>51</b>
<b>2010-2011 (2 Yr)</b>	15-19	2 664	12.45	0.33	0	
	20-24	19 352	18.93	3.66	6	
	25-29	22 260	16.47	3.67	7	
	30-34	18 648	18.61	3.47	10	
	35-39	16 144	21.26	3.43	5	
	40-44	15 999	22.35	3.58	3	
	45-49	14 575	26.15	3.81	2	
	50-54	6 482	25.24	1.64	0	
	55-59	1 221	23.75	0.29	0	
	<b>Total</b>				<b>23.88</b>	<b>33</b>

<sup>a</sup> Some estimates may have changed slightly compared to previous reports due to updated Canadian population and CAF Regular Force Male population and suicide numbers

A ten-year SMR was calculated as the increased numbers provided more power to detect a difference from the Canadian rates. Further aggregation was not attempted as this would have aggregated the period of time prior to heavy combat years in Afghanistan with heavy combat years, thus not helping to clarify the picture. For the



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ten-year period from 1995 to 2004, the SMR was 76%, indicating that the number of CAF Regular Force male suicides was 24% lower than that expected based on Canadian male rates taking the different age distributions into account. This finding was statistically significant as the upper confidence limit was less than 100%.

The 2005 to 2009 data (Table 1.2) indicate that the CAF Regular Force male population had a 14% lower suicide rate than the Canadian population after adjusting for the age differences between the populations. This SMR is not statistically significant as the confidence intervals include 100%. While the SMR for 2010/2011 is above 100%, the confidence intervals include 100%, making these results statistically non-significant. Finally, all SMR period confidence intervals overlap, suggesting that there is no statistically significant difference between the different 5-year SMRs. Particular caution should be taken with the interpretation of the 2010-2011 SMR, for a number of reasons:

- 1) the 2010-2011 SMR is based on only two years of data, the latter year having an atypically high number of suicides;
- 2) this SMR's confidence intervals are very wide, suggesting that this SMR is not stable;
- 3) this SMR's confidence intervals overlap with the previous 5-year SMR, which indicates that any change is not statistically significant.

### **C. Comparison of CAF Regular Force Male Suicide Rates by Deployment History to Canadian Rates using Standardized Mortality Ratios (1995 – 2011)**

Concern has been expressed that CAF Regular Force males with a history of ever being deployed may be more likely to die of suicide, in spite of prior analyses not showing such an effect. The SMRs according to a history of deployment are shown in Table 1.3.





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**Table 1.3: Standardized Mortality Ratios for Suicide in the CAF Regular Force Male Population by History of Deployment: 1995-2011**

Year	Age	CAF Regular Force Male Suicides With Hx of Deployment			CAF Regular Force Male Suicides Without Hx of Deployment						
		Expected	Observed	SMR (95% CI)	Expected	Observed	SMR (95% CI)				
<b>1995-1999 (5 Yr)</b>	15-19	0.01	0		0.78	2					
	20-24	1.33	2		5.78	5					
	25-29	4.90	3		8.31	11					
	30-34	8.07	10		12.06	7					
	35-39	7.84	4		11.26	6					
	40-44	4.21	1		5.76	2					
	45-49	2.13	0		3.15	3					
	50-54	0.73	0		1.35	0					
	55-59	0.01	0		0.08	0					
<b>Total</b>							<b>68% (42-105)</b>				<b>74% (52-103)</b>
<b>2000-2004 (5 Yr)</b>	15-19	0.01	0		0.86	1					
	20-24	1.33	1		4.84	5					
	25-29	3.56	3		3.90	6					
	30-34	6.45	6		4.56	2					
	35-39	9.42	6		7.21	4					
	40-44	6.75	6		5.66	4					
	45-49	2.89	3		2.62	2					
	50-54	1.12	0		1.30	1					
	55-59	0.06	0		0.10	0					
<b>Total</b>							<b>79% (51-117)</b>				<b>80% (52-119)</b>
<b>1995-2004 (10 Yr)</b>	15-19	0.02	0		1.67	3					
	20-24	2.69	3		10.60	10					
	25-29	8.42	6		11.90	17					
	30-34	14.59	16		16.11	9					
	35-39	17.49	10		18.29	10					
	40-44	11.12	7		11.42	6					
	45-49	5.03	3		5.75	5					
	50-54	1.86	0		2.65	1					
	55-59	0.08	0		0.18	0					
<b>Total</b>							<b>73% (54-98)</b>				<b>78% (60-101)</b>



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Year	Age	CAF Regular Force Male Suicides With Hx of Deployment			CAF Regular Force Male Suicides Without Hx of Deployment						
		Expected	Observed	SMR (95% CI)	Expected	Observed	SMR (95% CI)				
<b>2005- 2009 (5 Yr)</b>	15-19	0.01	0		0.87	0					
	20-24	1.28	4		6.00	6					
	25-29	3.36	3		4.61	4					
	30-34	4.62	2		2.97	3					
	35-39	7.38	6		3.21	5					
	40-44	8.56	11		4.15	2					
	45-49	5.22	3		3.11	0					
	50-54	1.74	0		1.28	1					
	55-59	0.20	0		0.21	0					
<b>Total</b>							<b>90% (60-129)</b>				<b>80% (49-122)</b>
<b>2010- 2011 (2 Yr)</b>	15-19	0.00	0		0.33	0					
	20-24	0.69	1		2.97	5					
	25-29	1.48	3		2.19	4					
	30-34	1.93	5		1.54	5					
	35-39	2.22	4		1.21	1					
	40-44	2.37	2		1.21	1					
	45-49	2.39	2		1.42	0					
	50-54	0.90	0		0.73	0					
	55-59	0.14	0		0.15	0					
	<b>Total</b>							<b>140% (82-224)</b>			

The SMRs in each of the 5 year or 10 year periods (prior to 2005) indicate that the observed number of CAF Regular Force male suicides is consistently less than that expected using general Canadian male suicide rates. For example, in the period from 1995 to 2004, the number of suicides among CAF Regular Force males with a history of deployment was 73% of that expected based on Canadian male suicide rates, meaning that male personnel who had ever deployed were 27% less likely to die of suicide compared to the Canadian population of males of the same age. This was also statistically significant as the confidence intervals did not include 100%. For CAF Regular Force males who did not deploy, the SMR was 78%, indicating that they were 22% less likely to die of suicide compared to the Canadian population of males of the same age; however this finding was not statistically significant. SMRs should not be compared to each other as they are based on different populations.

From 2005 to 2009, CAF Regular Force males who had a history of deployment were 10% less likely to die from suicide than Canadian males of the same age; however, this result was not statistically significant.

Although the figures for the two-year time period from 2010 to 2011 are shown for completeness, the confidence limits are very wide and the findings are not statistically significant. Consequently, while the SMRs appear to be substantially higher for both the deployed and non-deployed during 2010-2011 compared to previous years, it is unclear whether this non-statistically significant elevation in suicide risk in both the deployed and non-deployed population is due to an emerging trend or simply to random variation in the



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number of events from year to year, particularly in light of the number of suicides in 2011.

### D. CAF Regular Force Male Suicide Rates by Deployment History using Direct Standardization (1995 – 2014)

Tables 1.4 (5-year) and 1.5 (10-year) show the results of the direct standardization. Suicide rate ratios less than 1.0 suggest a decreased risk of suicide with a history of deployment; rate ratios greater than 1.0 suggest an increased risk with a history of deployment.

**Table 1.4: Comparison of CAF Regular Force Male 5-Year Suicide Rates by Deployment History using Direct Standardization (1995-2014)<sup>a</sup>**

Year	Age	Number of CAF Regular Force Male Person-Years	CAF Regular Force Male Suicide Rate/10 <sup>5</sup>		Age Adjusted Suicide Rate/10 <sup>5</sup>		Suicide Rate Ratio (95% CI)
			Hx of Depl	No Hx of Depl	Hx of Depl	No Hx of Depl	
<b>1995-1999 (5 Yr)</b>	15-19	4 056	0.00	49.83			
	20-24	26 521	40.23	23.20			
	25-29	52 268	15.47	33.47			
	30-34	72 904	34.23	16.02			
	35-39	64 964	15.00	15.67			
	40-44	33 881	6.98	10.22			
	45-49	18 769	0.00	26.78			
	50-54	7 766	0.00	0.00			
	55-59	404	0.00	0.00			
	<b>Total</b>	<b>281 533</b>	<b>19.05</b>	<b>20.39</b>	<b>19.83</b>	<b>19.90</b>	<b>1.00 (0.57-1.75)</b>
<b>2000-2004 (5 Yr)</b>	15-19	5875	0.00	17.26			
	20-24	28 433	16.29	22.43			
	25-29	36 274	17.34	31.62			
	30-34	48 996	20.91	9.85			
	35-39	65 618	16.14	14.06			
	40-44	47 569	23.19	18.43			
	45-49	20 602	27.77	20.41			
	50-54	9 256	0.00	20.10			
	55-59	700	0.00	0.00			
	<b>Total</b>	<b>263 323</b>	<b>19.14</b>	<b>18.84</b>	<b>18.42</b>	<b>18.13</b>	<b>1.02 (0.57-1.80)</b>



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Year	Age	Number of CAF Regular Force Male Person-Years	CAF Regular Force Male Suicide Rate/10 <sup>5</sup>		Age Adjusted Suicide Rate/10 <sup>5</sup>		Suicide Rate Ratio (95% CI)
			Hx of Depl	No Hx of Depl	Hx of Depl	No Hx of Depl	
<b>2005-2009 (5 Yr)</b>	15-19	7 413	0.00	0.00			
	20-24	39 044	58.09	18.66			
	25-29	45 557	15.61	15.19			
	30-34	41 004	12.00	18.74			
	35-39	47 665	18.06	34.63			
	40-44	50 003	32.66	12.25			
	45-49	31 279	15.29	0.00			
	50-54	11 899	0.00	19.87			
	55-59	1 749	0.00	0.00			
	<b>Total</b>	<b>275 613</b>	<b>20.63</b>	<b>16.13</b>	<b>22.38</b>	<b>17.01</b>	<b>1.37 (0.74-2.57)</b>
<b>2010-2014 (5 Yr)</b>	15-19	5 121	0.00	0.00			
	20-24	42 790	31.96	30.11			
	25-29	55 679	28.44	23.13			
	30-34	48 534	40.66	23.27			
	35-39	40 462	25.19	7.89			
	40-44	38 312	24.64	10.09			
	45-49	33 980	20.55	10.36			
	50-54	19 001	16.10	15.21			
	55-59	3 919	0.00	0.00			
	<b>Total</b>	<b>287 798</b>	<b>26.72</b>	<b>20.27</b>	<b>27.42</b>	<b>17.56</b>	<b>1.56 (0.91-2.66)</b>

<sup>a</sup> Some estimates may have changed slightly compared to previous reports due to updates in CAF Regular Force male population numbers.



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**Table 1.5: Comparison of CAF Regular Force Male 10-Year Suicide Rates by Deployment History using Direct Standardization (1995-2014)<sup>a</sup>**

Year	Age	Number of CAF Regular Force Male Person-Years	CAF Regular Force Male Suicide Rate/10 <sup>5</sup>		Age Adjusted Suicide Rate/10 <sup>5</sup>		Suicide Rate Ratio (95% CI)
			Hx of Depl	No Hx of Depl	Hx of Depl	No Hx of Depl	
<b>1995-2004 (10 Yr)</b>	15-19	9 931	0.00	30.58			
	20-24	54 954	27.01	22.81			
	25-29	88 542	16.35	32.79			
	30-34	121 900	27.63	14.07			
	35-39	130 582	15.66	14.98			
	40-44	81 450	17.42	14.54			
	45-49	39 371	16.33	23.81			
	50-54	17 022	0.00	9.99			
	55-59	1 104	0.00	0.00			
	<b>Total</b>	<b>544 856</b>	<b>19.10</b>	<b>19.72</b>	<b>19.10</b>	<b>19.13</b>	<b>1.00 (0.67-1.49)</b>
<b>2005-2014 (10 Yr)</b>	15-19	12 534	0.00	0.00			
	20-24	81 834	45.65	24.75			
	25-29	101 236	22.32	19.70			
	30-34	89 538	26.90	21.34			
	35-39	88 127	21.30	22.13			
	40-44	88 315	28.99	11.44			
	45-49	65 259	18.20	4.69			
	50-54	30 900	10.37	17.23			
	55-59	5 668	0.00	0.00			
	<b>Total</b>	<b>563 411</b>	<b>23.72</b>	<b>18.26</b>	<b>25.47</b>	<b>17.27</b>	<b>1.48 (0.98-2.22)</b>

<sup>a</sup> Some estimates may have changed slightly compared to previous reports due to updates in CAF Regular Force male population numbers.

The relationship between deployment and suicide risk has evolved over time. In the ten-year time period from 1995 to 2004, the standardized rate ratio suggests that having a history of deployment does not make one more or less likely to die from suicide compared to those who did not have a history of deployment. The suicide rate ratio of 1.00 indicates that the rate of suicide among those CAF Regular Force males with a history of deployment is the same as that found among those without a history of deployment. Data from 2005 to 2014 show that there is a non-statistically significant increased rate ratio in suicide deaths among those Regular Force males with a history of deployment compared to those without a history of deployment. However, as with the other time periods, the confidence interval for this finding contains 1.00, signifying that the results are not statistically significant. Furthermore, the confidence intervals for these different estimates also overlap, suggesting that there is no statistically significant difference between the 1995-2004 and the 2005-2014 suicide rate ratios.

The data for 2010-2014 (5-year) and 2005-2014 (10-year) both show suicide rate ratios appreciably above 1.00 (1.56 and 1.48, respectively), and are quite close to significance (both have lower confidence intervals



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close to 1.00). These suggest that those Regular Force males with a history of deployment may be at increased risk of taking their own lives, compared to those with no history of deployment, keeping in mind that the statistical power of the study is limited and, as mentioned in the methods, the age-specific rates for this population are extremely unstable.



## Chapter 2 – Results from the Medical Professional Technical Suicide Review, 2014

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### 2.1 Introduction

This new addition to the annual 2015 Report on Suicide Mortality in the Canadian Forces provides information on the methods of suicide, mental health and psycho-social factors, and operational deployment history that may have contributed to the 2014 suicides reported here. This addition is in replacement of the Medical Professional Technical Suicide Review Report<sup>5</sup> (MPTSR) produced annually by the Directorate of Mental Health at DND. MPTSRs are also conducted on Reservist suicides, provided that those that are reported to civilian authorities are brought to the attention of the CAF. While the original MPTSR reports focused on providing the evidence emanating from all completed investigations (both Regular and Reserve), the data presented here, in keeping with the rest of this report, focus on Regular Force males only.

### 2.2 Methods

The data presented here are collected during the MPTSR process, following a completed suicide. The MPTSR was one of the key recommendations from the 2009 CAF's Expert Panel on Suicide Prevention. These reviews do not replace Boards of Inquiry, but focus on health-related matters based on the latest scientific knowledge regarding suicide factors and prevention. The MPTSR process is valuable for a number of reasons. It acts as a rapid quality assurance mechanism to identify any deficiencies in the quality of care, it identifies opportunities to reinforce and enhance the CAF's suicide prevention program, and it provides more accurate and complete data which can be used for suicide surveillance. An MPTSR is ordered by the Surgeon General immediately following the confirmation of a suicide, and it is conducted by a team consisting of a mental health professional and a General Duty Medical Officer (GDMO or MO). This team reviews all pertinent health records and conducts interviews with medical personnel, unit members, family members and other individuals who may be knowledgeable of the circumstances of the suicide in question. All of this information is collated in an effort to better understand the circumstances that led to the suicide.

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<sup>5</sup> Heber, A.; Roux, S. Medical Professional Technical Suicide Review Report. Surgeon General Health Research Program SGR-2015-002. Ottawa: National Defence, 2015.



### 2.3 Results

A rare but tragic event, suicide is an important public health issue in Canada and for the Canadian Armed Forces. As defined by Durkheim in “Suicide: A Study in Sociology,”<sup>6</sup> suicide is the result of “complex interrelationships among a multiplicity of characteristics.”<sup>7</sup> As the determinants of suicide are multi-factorial, multi-faceted interventions are required to reduce the risk of suicide.

In an effort to better understand the underlying risk factors and characteristics of the Regular Force males who took their own lives in 2014, the data taken from the policy-mandated Medical Professional Technical Suicide Reviews (MPTSR) are presented here. While there were 16 Regular Force male suicides in 2014, we are reporting here on 15 events, as one review was still pending at the time of report release. As discussed in the methods, while the MPTSR report has historically reported on all completed investigations (both Regular and Reserve Force, involving both men and women), only the Regular Force male data are represented here. The reasons for doing so are as follows:

- 1) With the exception of one pending MPTSR form, complete data on all Regular Force male suicides was collected for 2014. We are therefore confident that the findings reported here are relatively complete and representative, and can therefore be used to make evidence-based policy and practice decisions.
- 2) The same conclusions cannot be drawn for the Reservist data. Given the underlying issues of reporting of Reserve Force suicides to the CAF, we cannot be confident as to the complete ascertainment of Reservist suicides. To use what limited evidence has been amassed for evidence-based policy and practice would require some confidence that these very few reports were in some way representative of the suicide experience in all (reported and unreported) Reserve Force suicides; this assumption cannot be made. Furthermore, it is probable that those individuals whose suicides were brought to the CAF’s attention were different in some systematic fashion from other Reserve Force suicides (e.g. history of deployment); however, in the absence of systematic identification of Reservist suicides, this remains a hypothesis.
- 3) Presenting Reserve data is also not an option, given the small number of Reserve Force suicides reported to the CAF (n=3). Providing Reserve Force case information would likely allow for the identification of individuals and would therefore contravene confidentiality rules.

Note that all suicide deaths are reviewed by means of MPTSRs to assess for lessons learned. The current plan is to include all MPTSRs in next year’s report, Regular and Reserve Force, male and female, for all years since MPTSRs were initiated.

#### A. Demographics

At the time of suicide, the majority of the deceased were married (Table 2.1). Of those who were reportedly married, 5 (55.6%) still resided with their spouse, while 4 (44.4%) were separated (different from those who were legally separated) due to relationship issues. One third (n=5) of the individuals had minor children, but none of the minor children were living with the respective individuals at the time of death.

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<sup>6</sup> Durkheim, E. *Suicide: A Study in Sociology*. London: Routledge, 1970.

<sup>7</sup> Lazarsfeld PF, Rosenberg M, eds. *The Language of Social Research*. Glencoe, IL: Free Press, 1955.





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**Table 2.1: Marital Status at Time of Death**

<b>Marital Status</b>	<b>N (%)</b>
Never married	2 (13.3%)
Common-law	2 (13.3%)
Married	9 (60.0%)
Legally separated or divorced	2 (13.3%)

Nearly half (46.7%) of the individuals had a high school education level, and 26.6% held a post-secondary education degree (Table 2.2).

**Table 2.2: Highest Level of Education at Time of Death**

<b>Level of Education</b>	<b>N (%)</b>
Some high school	3 (20.0%)
High school graduate	7 (46.7%)
Some college/technical school	1 (6.7%)
College degree	1 (6.7%)
Bachelor's degree	2 (13.3%)
Master's degree or higher	1 (6.7%)

### **B. Suicide Event Details**

Table 2.3 below provides a summary of method of suicide as identified by the MPTSR during the reported period. As reported elsewhere<sup>8,9</sup>, hanging, firearms and asphyxiation were the three most common methods of suicide. This is similar to the Canadian male population where hanging and firearms were also the two most common methods.<sup>10</sup>

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<sup>8</sup> Collins R, Matheson H, Sedge P, Girard, C. Medical Professional Technical Suicide Review Report. Surgeon General Health Research Program SGR-2013-007. Ottawa: Department of National Defence, 2013.

<sup>9</sup> Heber A et al. 2015, *ibid.*

<sup>10</sup> Navaneelann T. Suicide rates: An overview. Health at a Glance. Cat# 82-624-X. Ottawa: Ministry of Industry, 2012.



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**Table 2.3: Methods of Suicide**

Method of Suicide	N (%)
Hanging	8 (53.3%)
Firearm/gun (non-military issue)	4 (26.7%)
Asphyxiation <sup>a</sup>	2 (13.3%)
Drugs	1 (6.7%)

<sup>a</sup> Carbon monoxide, drowning, or helium-induced.

Of the suicides reported here, alcohol use at the time of the event was confirmed in 2 (13.3%) suicides while a combination of drug and alcohol use at the time of the event was also confirmed in 2 (13.3%) additional individuals. It was undetermined whether or not alcohol or drugs played a role in two-thirds (10) of these suicides. This does not mean that alcohol and/or drug use at the time of death were categorically ruled out; rather, this means that there was insufficient evidence to make a determination.

### C. Access to Care

Each of the 15 individuals included in this review had accessed a treatment facility at least one time prior to their suicide; most accessed three different services prior to the event (range: 1-5). Two-thirds of the individuals accessed at least one type of care within 30 days prior to their death; this percentage increases to 73.3% when the timeframe of access to care is increased to three months. Overall, 93.3% of the individuals had accessed some sort of health care within the year prior to their death.

The majority of the individuals (80.0%) accessed care from a medical treatment facility; of those who accessed their care through this facility (Table 2.4), 58.3% of them did so within 30 days prior to their death. It should be noted that the care sought at a medical treatment facility may not have been directly mental health-related.

**Table 2.4: Access to Care Prior to Suicide<sup>a</sup>**

Service	N (%)	% with access within 30 days
Medical Treatment Facility	12 (80.0%)	58.3%
Base Addiction Counsellor	4 (26.7%)	50.0%
Psychosocial Services <sup>11</sup>	7 (46.7%)	14.3%
Chaplain Services	3 (20.0%)	0.0%
Outpatient Mental Health	8 (53.3%)	75.0%
Inpatient Mental Health	5 (33.3%)	60.0%

<sup>a</sup> Total does not equal 100% as 93.3% of individuals accessed at least 2 services.

The absence of accessing care within 30 days of the suicide does not systematically imply a barrier to access; it may also mean that the individual accessed this type of care in the (not recent) past or that access was provided but that the patient delayed attending appointments. This type of behaviour is consistent with what is

<sup>11</sup> Includes care delivered by Social Workers, Mental Health Nurses and Addictions Counselors <http://www.forces.gc.ca/en/caf-community-health-services-mental/index.page#psychosocial-program>



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seen in the general population; in the 2012 Canadian Community Health Survey Mental Health cycle, when asked about barriers to receipt of mental health care, 43.2% of those with mental health needs suggested that they “[prefer] to manage on [their] own.

### D. Mental Health Factors

Over half of the individuals (53.3%) had a documented mood disorder, including depression (40.0%) and dysthymia (6.7%). Four individuals (26.7%) had an anxiety disorder, including panic disorder (13.3%) or an acute stress disorder (6.7%). Four individuals (26.7%) had both a mood and an anxiety disorder at the time of death. In addition, 13.3% of the individuals had been diagnosed with PTSD more than three months prior to their death, and 20% of the individuals had been diagnosed with a traumatic brain injury over a year prior to their death. The fraction of these mental health factors that were operational stress injuries was not captured by the MPTSR.

Documented evidence of prior suicidal ideation and/or prior suicide attempts was noted for 5 (33.3%) individuals. It is plausible that the prevalence of suicidal ideation and/or attempts within these individuals was higher than reported here, either because suicidal ideation and/or prior attempts were denied by the patient or suicidal ideation was not present at the time of the last visit to a medical care facility. Note that all CAF members are asked about suicidal ideation on the Periodic Health Assessment (PHA) form. PHAs are done every 5 years for those less than 40 years of age and every 2 years for those 40 or older.

### E. Non-Mental Health Factors

The MPTSR forms collect a non-exhaustive list of possible work and life stressors that may have contributed to a person’s decision to take their own life. Table 2.5 below provides more detailed information on the prevalence of these factors within the 2014 Regular Force males who died from suicide.

**Table 2.5: Prevalence of Documented Work and Life Stressors Prior to Suicide**

<b>Factor</b>	<b>N (%)</b>
Failed/failing spousal/intimate partner relationship	12 (80.0%)
Failed other relationship (e.g. family, friends)	4 (26.7%)
Completed spousal, family or friend suicide	5 (33.3%)
Family or friend death (other than suicide)	1 (6.7%)
Physical health problem	7 (46.7%)
Ill family member	3 (20.0%)
Debt	6 (40.0%)
Job, supervisor or work performance problem	8 (53.3%)
Legal problem(s)	6 (40.0%)

All Regular Force male suicides in 2014 reportedly had at least one of the stressors listed in Table 2.5; 80% of them had more than one stressor, and nearly half of the suicides (46.7%) reportedly had four to seven concomitant stressors prior to their death.

During their lifetimes, 3 individuals (20%) had documented histories of being physically, sexually, and/or emotionally abused, while 5 (33.3%) individuals had been the perpetrators of physical abuse and/or emotional



abuse.

At the time of death, nearly half of all the individuals (46.7%) were in the process of going through some sort of legal or disciplinary proceeding or an administrative review process (e.g. release, AWOL, Medical or Career Review Board). All seven individuals were either the subject of administrative proceedings e.g., disciplinary action, release, legal action (20%), a Medical Review Board (20%), or both (6.7%). Of these 7 individuals, over 70% were the subject of more than one proceeding at the time of their death.

### 2.4 Recommendations Resulting from 2014 MPTSR Process

At the time of writing 18 MPTSRs involving Regular and Reserve Force personnel were completed for the calendar year 2014. From these reviews a total of 29 recommendations were made. While there was no evidence presented to indicate that any of the suicides were readily preventable, recommendations were identified which will further enhance the three pillars of the CAF suicide prevention program (excellence in health care; effective leadership; aware and engaged members). The main recommendation categories were around policy, education, and clinical care.

With respect to policy recommendations emanating from the 2014 MPTSRs, several pertained to medical documentation. Recommendations referenced the need for timely inclusion of relevant health information in the electronic health record. Examples included addiction assessments, external providers' reports, and collaborative care meeting reports. The importance of timely documentation will be reinforced during the annual Mental Health National Workshop as well as through changes to the CF Health Information System (CFHIS) in 2015 which will allow for direct entry of all mental health clinical notes into the patient's file.

Additionally, two reviews stressed the need for clinicians to become better informed on health care policies. Policies that were specifically identified were the policy on handling no-show appointments and the policy on access to external treatment providers for medical personnel. These recommendations are being considered by the Directorate of Medical Policy.

Three recommendations were related to education. Topics identified included suicide prevention and resources, illicit drug use, and temporary and permanent medical categories. Two of the three recommendations are currently in place through Road to Mental Readiness (R2MR)<sup>12</sup> and Strengthening the Forces Health Promotion programs. The third recommendation dealing with medical categories has been referred to the Clinical Quality Assurance Committee for their review.

Several recommendations related to clinical care were also made. These included recommendations regarding the application of Medical Employment Limitations as one means to convey to the chain of command that a member may require increased support. Two recommendations also stressed the need for post-suicide activities focusing on increased support for medical personnel as well as colleagues of a member following a suicide or serious suicide attempt.

A number of the other recommendations reinforced processes already in place. These included enhanced screening for isolated postings; the inclusion of the family in the member's health care, and strengthening the

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<sup>12</sup> <http://www.forces.gc.ca/en/caf-community-health-services-r2mr/index.page>



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relationship between the military and civilian health care system to enhance continuity of care and discharge planning.

All recommendations have been or will be reviewed and actioned as appropriate by the CF Health Services Group Clinical Quality Assurance Committee or the Quality and Patient Safety Advisory Committee.



## Chapter 3 – Selected Analyses on Regular Force Male Suicide in the Canadian Armed Forces, by Command, 2002-2014

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### 3.1 Introduction

In 2011 an increase in suicides in Regular Force males in the Canadian Armed Forces (CAF), combined with similar evidence emanating from the US,<sup>13,14</sup> raised concerns that Regular Force males within the Army Command might have a higher rate of suicide than the Regular Force males within other Commands. Preliminary analyses (of Regular Force males by Command) completed in September 2011 suggested a higher suicide rate over a ten year period (2002 to 2011) in the Army Command compared with the Air Force Command and the ‘other’ Command category.<sup>15</sup> A subsequent analysis<sup>16</sup> identified a statistically significantly higher crude suicide rate for Regular Force males in the Army Command relative to other Commands. However, it also identified no significant differences between the suicide rates for the Combat Arms specifically and all other trades.

To further examine suicide trends in Regular Force males in the CAF, the following analyses were conducted for the time period of January 2002 to December 2014: 1) calculation of crude rates for the Army versus the non-Army Commands and age-adjusted rates by these same groupings, 2) re-calculation of the suicide rate in the Combat Arms trades; and 3) the calculation of an age-standardized moving average suicide rate per 100,000 population, both for Army and non-Army Commands.

This chapter provides a summary of the results, methods and limitations of these analyses. Each analysis has limitations which must be considered with the results; as such the limitations section is highlighted directly beneath the result section for each analysis.

### 3.2 Methods

#### A. Suicide Data and Related Demographic Information (Numerator Data)

Information on the number of suicides per year in the CAF as well as specific information on the name, year of death, age, sex and unit of persons who died of suicide was obtained from the Directorate of Casualty Support Management (DCSM) until September 2012, after which data was provided by the Administrative

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<sup>13</sup> United States Army. Health Promotion, Risk Reduction, Suicide Prevention Report. Washington, DC: U.S. Army; 2010.

<sup>14</sup> Kuehn B. Soldier suicide rates continue to rise: military, scientists work to stem the tide. *Journal of the American Medical Association*. 2009;301:111,113.

<sup>15</sup> Wiens M. Brief Report: CF Regular Force Male Suicide Rate by Command. DFHP, DND: Ottawa, 2011.

<sup>16</sup> Rolland-Harris E, Fontaine J. Brief Report: Selected Analyses on Suicide in the Canadian Armed Forces, by Command, 2002-2013. DFHP, DND: Ottawa, 2014.



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Investigative Support Centre (AISC) of the Directorate Special Examinations and Inquiries (DSEI). Information on component, environment, Military Occupational Structure ID/Military Occupation code (MOSID/MOC), last known department description and last known location were obtained through an ad hoc request to the Directorate of Human Resources Information Management (DHRIM) using Human Resources Management System (HRMS) data.

Command was ascertained in three fashions:

- 1) If Command was explicitly stated in the Medical Professional Technical Suicide Review (MPTSR) Report<sup>17</sup> or in the Suicide Event Report for an individual (2011-2014 cases), the Command information provided by the MPTSR was used.
- 2) However, if information as to which CAF Command an individual belonged was not available in the MPTSR or the DCSM/AISC database, individuals were assigned into Army or Non-Army Command categories based on their home unit information.
- 3) In some cases, MOC/MOSID and rank were also used to classify individuals if the home unit information was not clear. This subjective method may have led to misclassification of some suicides into an incorrect Command, affecting the validity of the results.

MOSID information for the analysis involving the “Army Trade” was obtained directly from DHRIM. Individuals were considered to be employed in an Army trade if they had the following MOSIDs: 00005 (CRMN), 00008 (ARTYMN-FD), 00009 (ARTYMN-AD), 00010 (INFMN), 000178 (ARMD), 000179 (ARTY), 000180 (INF), 000181 (ENGR), 00339 (CBT ENGR) and 00368 (ARTYMN) (since 2012).<sup>18</sup>

### **B. Number of CAF Regular Force Males at Risk (Denominator Data)**

The number of CAF Regular Force males by Command and Army MOSIDs for each year (denominators) was provided by DHRIM using an ad hoc request.

### **C. Analysis**

Data are presented as raw numbers of Regular Force male suicides and crude rates (per 100,000) over the last twelve years (from January 2002 to December 2014), which were also the years that the Canadian Armed Forces (CAF) was deployed to Afghanistan. Rates were calculated by dividing the number of Regular Force male suicides by the total number of person-years of time accumulated. In addition, age-adjusted rates and rate ratios were calculated using direct standardization for the Command analyses. This was done in order to adjust for the potentially different age structures between the groups (i.e. to control for potential confounding by age). The rates for each Command were age-standardized using the total CAF Male Regular Force population as the standard population. 95% confidence intervals were calculated using the Poisson distribution 95% confidence limits.

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<sup>17</sup> Collin R, Matheson H, Sedge P, Girard C. Medical Professional Technical Suicide Review Report. Ottawa: Directorate of Mental Health, Department of National Defence, September 2013. Cat #SGR-2013-007.

<sup>18</sup> Details on the different MOSIDs, including the general duties associated with them, are available at: <http://www.forces.gc.ca/en/about-policies-standards-medical-occupations/cf-mosid-task-statements.page>



### 3.3 Results

#### A. Suicide in Regular Force Males in the CAF by Army vs. Non-Army Command, 2002 to 2014

Table 3.1 describes the number of CAF Regular Force male suicides by year in each Command grouping (Army and Non-Army) as well as the crude suicide rate per 100,000 population for each of the aforementioned groupings. Over the past 13 years, there were 80 Regular Force male suicides occurring in the Army Command and 67 occurring in all other Commands combined (Navy, Air Force and Other). The confidence intervals for the rate in each Command did not overlap indicating that there was a statistically significant difference in the crude Regular Force male suicide rates between the Army and Non-Army Commands.

**Table 3.1: CAF Regular Force Male Crude Suicide Rates by Army vs. Non- Army Command, 2002 to 2014**

Year	Number of CAF Regular Force Males by Command		Number of CAF Regular Force Male Suicides by Command		CAF Regular Force Male Suicide Rate by Command per 10 <sup>5</sup> (95% CI)	
	Army	Non-Army	Army	Non-Army	Army	Non-Army
2002	18 379	34 607	5	4	30.13 (24.05, 37.67)	14.53 (11.34, 18.58)
2003	18 953	35 076	3	6		
2004	19 098	34 642	5	5		
2005	18 859	34 632	5	5		
2006	18 863	35 329	3	4		
2007	19 497	35 410	2	7		
2008	19 829	35 951	5	8		
2009	21 503	35 595	6	6		
2010	23 547	35 605	5	7		
2011	22 665	36 062	15	6		
2012	22 066	36 128	8	2		
2013	21 325	36 362	9	0		
2014	20 911	35 788	9	7		
<b>2002-2014</b>	<b>265 495</b>	<b>461 187</b>	<b>80</b>	<b>67</b>		

During the 13 year period depicted in Table 3.1, the Army Command crude suicide rate amongst Regular Force males was twice that of non-Army Command Regular Force males. For comparison, Figure 3.1 shows the five year crude rates for the 2005-2009 and 2010-2014 time periods. When broken down into 5-year time periods (Figure 3.1 below), the crude rate differential between Army and non-Army Command Regular Force males was 3-fold in 2010-2014. While there was no statistically significant difference in the crude suicide rate between Army and Non-Army Commands during the 2005-2009 period, the confidence intervals for the two groups in 2010-2014 do not overlap; this indicates a statistically significant difference in the crude suicide rates for these two Command groupings.

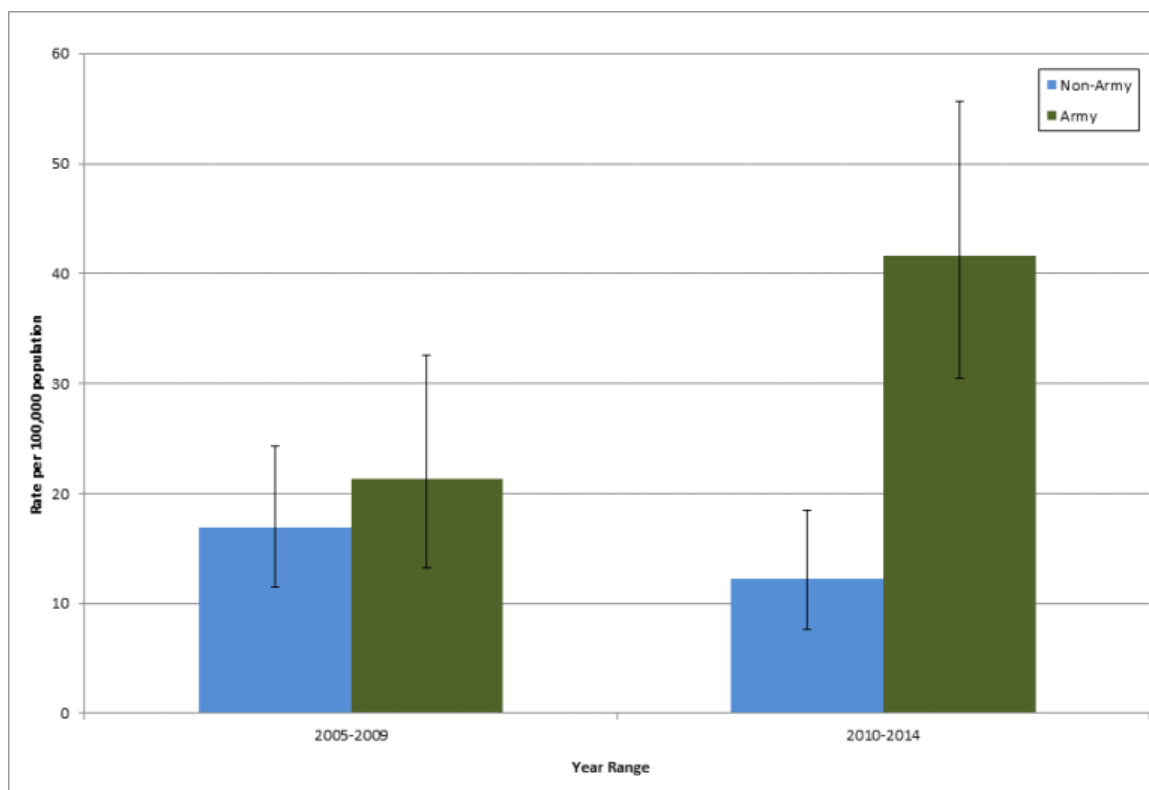
It is important to remember that a crude rate does not adjust for other potential conditions or circumstances





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4(including confounders). As was outlined in previous chapters in this report, the statistical probability of a military member taking his/her own life is influenced by a number of inter-related social factors; crude rates do not take these into consideration. It can, however, highlight the imbalances in the burden of suicide in the CAF, with a disproportionately large part of the burden being placed on the Army Command.



**Figure 3.1. Five year crude suicide rates by Command, 2005-2009 and 2010-2014, Regular Force Males only**

Table 3.2 below provides the age-adjusted Regular Force male suicide rates and the suicide rate ratios comparing Army and Non-Army Command. The rate ratio was 2.02, meaning that the age-adjusted suicide rate among Regular Force males in the Army was approximately 2 times greater than that in the Non-Army Commands; this finding was significantly different, which was not the case in previous comparisons. These findings may be partially explained by two factors: 1) previous analyses compared the Army Command to all other Commands separately (i.e. not grouped as one “Non-Army” Command),<sup>19</sup> and 2) this current analysis included the period 2013, where all (n=9) Regular Force male suicides were attributed to the Army Command, thereby substantially changing the ratio of Army to Non-Army Command suicides.

<sup>19</sup> Rolland-Harris E, Fontaine J. Brief Report: Selected Analyses on Suicide in the Canadian Armed Forces, by Command, 2002-2013. DFHP, DND: Ottawa, 2014.



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**Table 3.2: Age-adjusted Suicide Rates for Regular Force Males by Army vs. Non-Army Command, 2002-2014**

Age Group	Crude Suicide Rate per 100,000		Age-adjusted Suicide Rate per 100,000		Suicide Rate Ratio (95% CI)
	Army	Non-Army	Army	Non-Army	
15-19	0	0			
20-24	35.34	20.11			
25-44	28.57	15.84			
45-64	36.18	9.33			
<b>Total</b>	<b>30.13</b>	<b>14.53</b>	<b>30.14</b>	<b>14.95</b>	<b>2.02 (1.45, 2.81)</b>

### **B. Comparison of CAF Regular Force Male Suicide Rates Using Standardized Mortality Ratios (SMRs): 2002-2011, Stratified by Army versus Non-Army Command**

Table 3.3 below illustrates the standardized mortality ratios for all Commands grouped together, as well as Army and Non-Army Commands separately. The Non-Army SMR of 0.74 indicates that Non-Army Command CAF Regular Force males were at lower risk of a suicide event relative to the Canadian population. Furthermore, as the confidence intervals of this SMR do not overlap 1.0, this finding is significant. Conversely, the Army and All Command SMRs overlap 1.0, and were therefore not significant. So although the SMR for the Army Command is above 1.0, there is no difference between the Regular Force male suicide rate in the Army and the general Canadian population.



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**Table 3.3. Standardized Mortality Ratios for Suicide in CAF Regular Force Males by Command, 2002-2011**

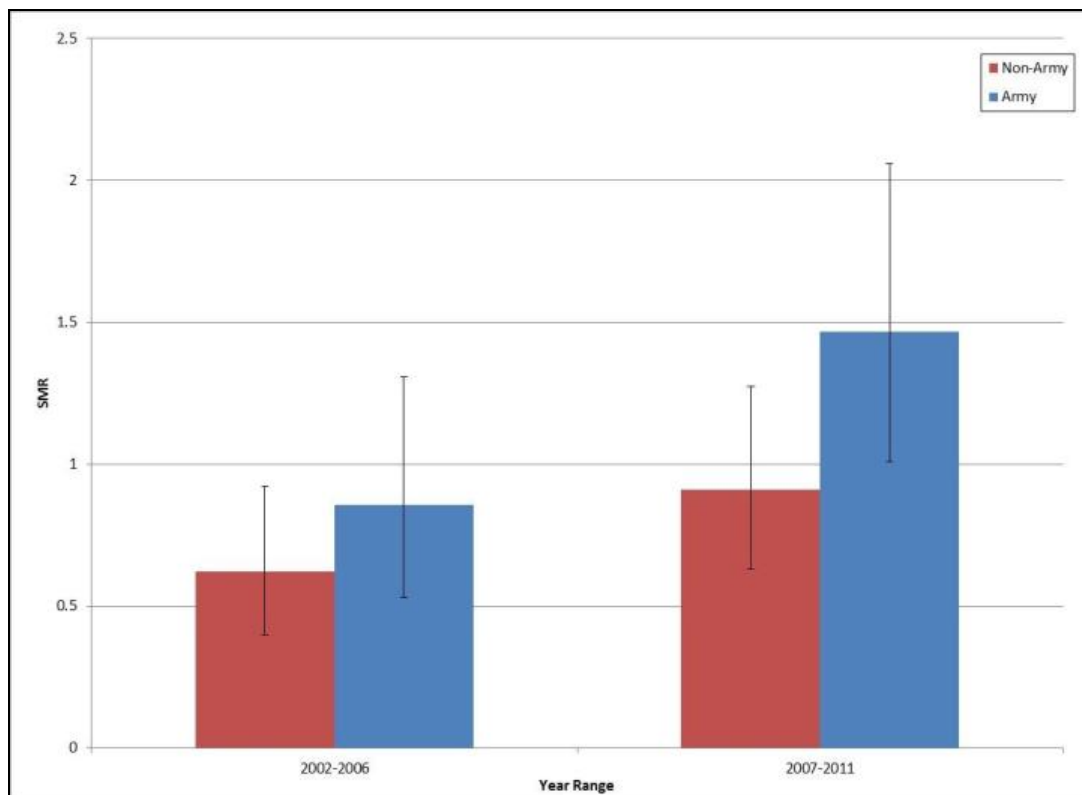
Command/ Year	Age	Number of CAF Personnel (PYs)	Canadian Male Suicide Rate (per 100,000)	Expected # of Male CAF Suicides	Observed # of Male CAF Suicides	SMR for Suicide (95% Confidence Intervals)
Army/ 2002-2011	15-19	4890	12.79	0.63	0	
	20-24	43073	19.37	8.34	12	
	25-29	48449	17.98	8.71	14	
	30-34	40899	19.61	8.02	8	
	35-39	38857	22.95	8.92	7	
	40-44	33045	24.67	8.15	6	
	45-49	19581	26.52	5.19	6	
	50-54	7230	25.57	1.85	1	
	55-59	1126	23.38	0.26	0	
<b>TOTAL</b>		<b>237150</b>	<b>21.60</b>	<b>50.08</b>	<b>54</b>	<b>1.08 (0.81, 1.41)</b>
Non-Army/ 2002-2011	15-19	9855	12.79	1.26	0	
	20-24	38581	19.37	7.47	9	
	25-29	47342	17.98	8.51	6	
	30-34	52122	19.61	10.22	12	
	35-39	65976	22.95	15.14	12	
	40-44	69738	24.67	17.20	14	
	45-49	45853	26.52	12.16	4	
	50-54	20253	25.57	5.18	1	
	55-59	3189	23.38	0.75	0	
<b>TOTAL</b>		<b>352909</b>	<b>21.60</b>	<b>77.90</b>	<b>58</b>	<b>0.74 (0.60, 0.97)</b>
All Commands/ 2002-2011	15-19	14745	12.79	1.89	0	
	20-24	81654	19.37	15.82	21	
	25-29	95791	17.98	17.23	20	
	30-34	93021	19.61	18.24	20	
	35-39	104833	22.95	24.06	19	
	40-44	102783	24.67	25.35	20	
	45-49	65434	26.52	17.35	10	
	50-54	27483	25.57	7.03	2	
	55-59	4315	23.38	1.01	0	
<b>TOTAL</b>		<b>590059</b>	<b>21.60</b>	<b>127.97</b>	<b>112</b>	<b>0.88 (0.72-1.07)</b>

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**C. Comparison of 5-Year CAF Regular Force Male Suicide Rates Using Standardized Mortality Ratios (SMRs): 2002-2006 and 2007-2011, Stratified by Army versus Non-Army Command**

Figure 3.2 below illustrates the differences in SMRs for Army and Non-Army Command, grouped by 5-year periods. Similarly to the findings outlined in Table 3.3, while the Army SMRs appeared to be higher than the Non-Army SMRs across both time periods, the confidence intervals for each time period overlapped. This demonstrates that the differences outlined here were not statistically significantly different. Furthermore, it also illustrates that the Army Command SMRs had quite large confidence intervals (particularly during the 2007-2011 time period), suggesting substantial variation in rates across the years.



**Figure 3.2. Comparison of 5-Year Suicide SMRs by Command, Regular Force males only, 2002-2006 and 2007-2011**



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### D. Suicide in Regular Force Males in the Combat Arms, 2002 to 2014

The suicide rate in Army trades (i.e. combat arms) in the Regular Force male population was also calculated. Between 2002 and 2014, there were a total of 56 suicides among Regular Force males who had an Army trade MOSID. There were no suicides during this time frame in females with an Army trade MOSID.

The suicide rate in the Regular Force male population who were in an 'Army trade' appeared higher than the overall suicide rate of all Non-Combat Arms Regular Force males [30.35 (95% CI, 23.03, 39.69) versus 18.21 (95% CI, 14.75, 22.54)]. As the confidence intervals between the two rates did not overlap, the difference was statistically significant, indicating an increased risk of suicide in Regular Force Male Combat Arms relative to those in Non-Combat Arms.

### E. Three-year Moving Average of Suicide Rates for Regular Force Males by Army versus Non-Army Command, 2002-2014

Because the annual suicide numbers for the Canadian Armed Forces are small, they are highly influenced by annual variability. Moving averages, which take an average of the year of interest as well as the previous and following year,<sup>20</sup> has been used by others in a similar military suicide context.<sup>21</sup> This method attempts to control the aforementioned variability caused by small numbers and provide a snapshot of potential temporal trends in the data.

Figure 3.3 shows the moving average trends for All Commands combined (represented by the triangular markers), Army Command only (represented by the diamond markers) and for the Non-Army Command (represented by the square markers). What this figure illustrates is that while the Army Command rate was always slightly higher or equal to other Commands grouping up until 2008, 2009 onwards showed a larger rate increase in Army than in non-Army or All Commands. Between 2009 and 2012, the non-Army moving average rate appeared to be decreasing, but has been levelling since then.

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<sup>20</sup> For example, the moving average value for 2006 would be an average of 2005, 2006 and 2007. For 2002 and 2014 where there are no prior and/or subsequent years, the moving average was based on two years' worth of data (e.g. 2014 = average of 2013 and 2014).

<sup>21</sup> Defence Analytical Services and Advice. Suicide and Open Verdict Deaths in the UK Regular Armed Forces 1984-2012. DASA (MoD): Bristol, UK. Retrieved 27-Feb-2014: <http://www.dasa.mod.uk/publications/health/deaths/suicide-and-open-verdict/2012/2012.pdf>

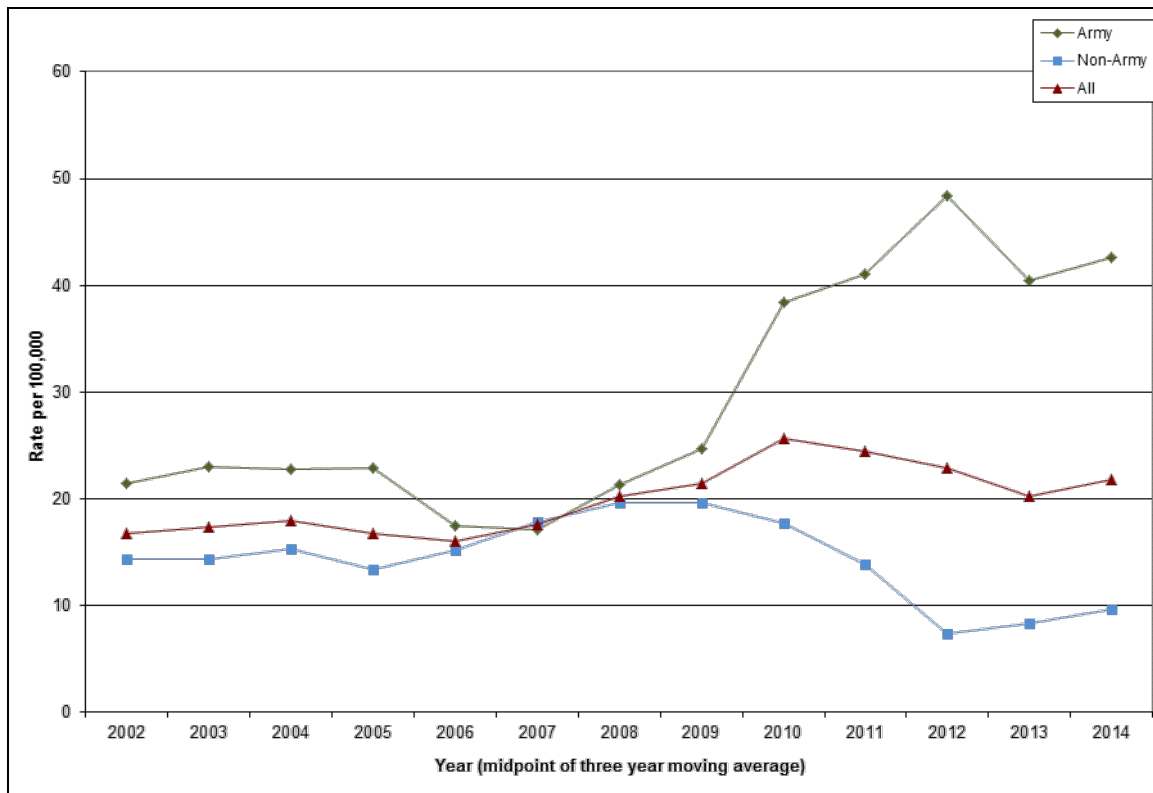


Figure 3.3. Three year-moving averages by Command, Canadian Armed Forces, 2002-2014

### 3.4 Data Limitations

The results of this chapter are subject to several potential limitations and when interpreting the data one must consider the following:

- 1) The numbers on which these analyses are based are very small and unstable; consequently, these findings must be interpreted with caution.
- 2) Furthermore, since the individual's last known unit/base was used to categorize Command, this did not take into account that the individual may have just recently been posted to that Command and therefore not really have functioned under that Command yet (for example, when one goes on training).
- 3) The denominators for this study (number of CAF Regular Force males in each Command) may also be inaccurate since the DHRIM system is sometimes not updated on a regular basis, thus, depending on when the report was run the numbers may differ.
- 4) The lack of DHRIM data prior to 2002 makes it impossible to ascertain whether the pre-Afghanistan suicide experience for Army Command relative to Non-Army Command was any different to what is described here.



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- 5) Finally, the wide confidence intervals for many of the rates reported here indicate that the analyses may not have the power to detect statistically significant differences.



## Chapter 4 – Discussion and Conclusions

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### 4.1 Discussion

The finding that CAF Regular Force male suicide rates are not significantly higher than the general Canadian population rates is consistent with a broad range of studies comparing the risk of suicide in military personnel relative to civilians.<sup>22</sup>

As shown in Table 1.1, Regular Force male suicide rates in the CAF are stable. While the crude suicide rate increased in the 2010 to 2014 time period compared to earlier years, this increase was not statistically significant. During the five-year time period of 2010 to 2014, there would need to have been a total of 83 suicides (compared to the 68 that occurred) for there to be a statistically significant increase from the rate for 2005 to 2009. As a result of low numbers of observed events, the power to detect small but important differences in suicide rate is limited in the CAF.

The SMR analysis comparing the number of observed CAF Regular Force male cases to expected cases based on Canadian rates is also limited by the small numbers. Note that if the 95% confidence intervals include 100%, this indicates that the difference between CAF Regular Force male rates and Canadian rates is not statistically significant. However, Table 1.2 demonstrates that in the ten-year period from 1995 to 2004 the suicide rate among CAF Regular Force males was statistically significantly lower than the corresponding Canadian rate. Over the same time period, the SMRs in Table 1.3 comparing the observed number of cases of those Regular Force males with a history of deployment with the expected number of cases based on Canadian rates also demonstrate that deployment does not place CAF personnel at higher risk; this is also statistically significant. However, the direct standardization rates for 2010-2014 indicate that the relationship between history of deployment and risk of suicide is almost statistically significant.

While there may be some discordant evidence emanating from the two standardized analyses of the relationship between a history of deployment and suicide, it should be noted that:

- 1) While direct standardization is usually preferred in epidemiology as this approach allows for the comparison of two different rates (e.g. suicide rate in those with a history of deployment compared to the rate in those without a history), it is also very unstable in situations where there are small numbers, and where the number of events and resultant rates are prone to random variation (both true of Regular Force male suicide in the CAF).
- 2) The generation of both direct and indirect rates is only a univariate look into the underlying risk factors associated with Regular Force male suicide in the CAF; in other words, the analysis only looks

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<sup>22</sup> Zamorski M. Suicide prevention in military organizations. *International Review of Psychiatry*. 2011;23:173-80





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at the relationship between one factor and suicide, thereby overlooking suicide's multifactorial etiology. In the case of the directly standardized rate for suicide between 2005 and 2014 by history of deployment, it would appear that within this time period, younger CAF Regular Force males were less likely to deploy compared to older (middle-aged) Regular Force males who were more likely to deploy. However, with the knowledge that middle-aged males are now the highest risk group for suicide in the general Canadian population,<sup>23</sup> the strong possibility emerges that other factors, in addition to deployment, may also contribute to an increased suicide risk.

- 3) Both of these analyses have been conducted using a very crude measure of deployment (dichotomous yes or no to having any history of deployment). This approach diminishes the differential influence of the different characteristics of any deployment (notably the extent of exposure to psychological trauma) on the probability of a Regular Force male taking his own life. Given the small annual number of suicides, this has been the categorization of deployment that was best suited to this limitation. However, this means that all results based on it must always be interpreted with caution.

The 2015 report also provides some background information on the demographics, risk factors, and access to care prior to 15 of the 16 Regular Force males' suicides that occurred in 2014. While it would appear that prior mental health problems (especially mood disorders), failing spousal relationships, and being subject to disciplinary/legal/administrative proceedings were frequently reported as characteristics of people whose suicides are reported here, it is impossible to comment on whether the prevalence rates reported here are appreciably different from those found in the rest of the Regular Force male CAF population. However, these findings are consistent with findings in other military organizations,<sup>24,25</sup> and, as such, potentially provide some insight as to where suicide prevention and action should continue to be directed – namely towards the continued timely access to care, and in the provision of relationship, debt and anger counselling and education.

The findings from the 2014 MPTSR process has also resulted in the development of a number of recommendations that will require further assessment from various CAF and DND directorates who are involved in the health and well-being of the CAF. While it remains impossible to prevent each and every suicide, the CAF continues to actively work towards identifying and addressing the modifiable risk factors associated with an increased risk of suicide, both amongst Regular and Reserve Force personnel.

The results of the analyses looking at the impact of Environmental Command on Regular Force male suicide completion in the CAF may also be influenced by some of the same underlying risk factors and confounders that complicate the discussion about the link between deployment and suicide risk in the CAF. It is therefore clear, both from this observation and others, that simple univariate epidemiological analyses are no longer sufficient to adequately and accurately describe the Regular Force male suicide experience in the CAF, nor do they provide sufficient evidence to confidently make pronouncements on the presence or importance of potential risk factors. New data sources, including the 2013 Canadian Forces Mental Health Survey, provide

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<sup>23</sup> Navaneelann 2012, *ibid*.

<sup>24</sup> Reger MA, Smolenski DJ, Skopp NA, Metzger-Abamukand MJ, Kang HK, Bullman TA, Perdue S, Gahm GA. Risk of Suicide Among US Military Service Members following Operation Enduring Freedom or Operation Iraqi Freedom Deployment and Separation from the US Military. *JAMA Psychiatry*. 2015. doi:10.1001/jamapsychiatry.2014.3195.

<sup>25</sup> Bush NE, Reger MA, Luxton DD, Skopp NA, Kinn J, Smolenski D, Gahm GA. Suicide and Suicide Attempts in the U.S. Military, 2008-2010. *Suicide and Life-Threatening Behavior*. 2013; 43(3): 262-73.



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us with additional tools and resources to better elucidate the underpinnings of the relationship between suicide and Environmental Command. Additionally, there now exist 20 years of suicide surveillance data that may be useful in conducting more rigorous, in-depth multivariate analyses (including regression analyses). To do this properly, risk factor information is needed on all suicides and from a control group of CAF personnel.<sup>26</sup> These advanced approaches will allow for the control of age as a confounder in deployment, as well as other risk factors for suicide. They will also allow the CAF to determine the optimal approach to classifying deployment; for the purpose of the analyses in this report, deployment is defined as **any** deployment, of any length of time, and of any type (combat vs. peacekeeping vs. humanitarian). Alternate approaches in the literature have included looking at the total number of deployments,<sup>27,28,29</sup> length of first deployment,<sup>28</sup> total duration of all deployments,<sup>28,29</sup> specific location(s) of deployment,<sup>28</sup> isolation level of deployment(s),<sup>27</sup> occupation during deployment,<sup>27</sup> and the categorization of combat exposure.<sup>27,30</sup> We expect to conduct this analysis in the future, pending access to population-level data that are required to conduct such an analysis. In the process of undertaking this analysis, the different aforementioned approaches to qualifying deployment will all be considered.

Overall, it is clear from the evidence presented in this report that the narrative around suicide in the Canadian Armed Forces has been gradually evolving over the last 20 years. Over time, the strong protective relationship between service in the CAF and suicide has been slowly changing, and a new landscape is emerging in which we see higher rates in: 1) Regular Force males within the Army Command, 2) Regular Force males within the Combat Arms, and 3) previously-deployed Regular Force males. In addition, a growing gap is emerging between Regular Force male suicide rates in the Army Command versus non-Army Commands, which is consistent with findings from the US Armed Forces. While concerning, one cannot conclude that this demonstrates insufficient mental health resources. In fact, data from the Mental Health Survey and findings from the 2014 MPTSRs have indicated that demands for mental health care have been met, such that access is well above that seen in the provincial and territorial health care systems.

It is far more probable that the changing trends are caused by two other larger forces at play:

- 1) There is strong evidence that the CAF mission in Afghanistan has had a powerful impact on the mental health of an important minority of personnel who deployed in support of it.<sup>29</sup> Clear differences in the prevalence of mental disorders among personnel who deployed in support of that mission and other personnel have also been demonstrated.<sup>31</sup> The clear conceptual and empirical links between

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<sup>26</sup> Sakinofsky I, Lesage A, Escobar M, Wong A, Vanier C. Suicide in the Canadian Armed Forces with Special Reference to Peacekeeping. Ottawa: Directorate of Health Protection and Promotion, Department of National Defence, 1996

<sup>27</sup> Garber BG, Zamorski MA, Jetly R. Mental Health of Canadian Forces Members While on Deployment to Afghanistan. *Can J Psychiatry*. 2012;57(12): 736-44.

<sup>28</sup> Boulos D, Zamorski MA. Deployment-related mental disorders among Canadian Forces personnel deployed in support of the mission in Afghanistan, 2001-2008. *Can Med Assoc J*. 2013;185(11):E545-52.

<sup>29</sup> LeardMann CA, Powell TM, Smith TC, Bell MR, Smith B, Boyko EJ, Hooper TI, Gackstetter GD, Ghamsary M, Hoge CW. Risk Factors Associated With Suicide in Current and Former US Military Personnel. *JAMA*. 2013;310(5):496-506.

<sup>30</sup> Wells TS, Miller SC, Adler AB, Engel CC, Smith TC, Fairbank JA. Mental health impact of the Iraq and Afghanistan conflicts: a review of US research, service provision, and programmatic responses. *Int Rev Psychiatry*. 2011;23:144-52.



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deployment-related trauma, mental disorders, and suicidality<sup>31</sup> make these trends in patterns of Regular Force male suicidal behaviour in the CAF understandable.

- 2) Second, the CAF's retention practices for personnel with mental disorders have evolved. Personnel who have recovered fully from mental disorders may continue to serve provided that they meet Universality of Service standards.<sup>27,31</sup> For those who do not recover completely, time to release is now more prolonged than in the past.

We must reiterate here that suicide is a multifactorial event that is explained by more than deployment alone; consequently, disproportionate focus on selected factors runs counter to the CAF's public health approach to suicide prevention. Focusing only on deployment, PTSD or any of the other risk factors discussed in this report is an ineffective approach to suicide prevention.<sup>31</sup>

### 4.2 Conclusions

The following conclusions are reached with the understanding that statistical analysis may not identify a true difference due to the small total number of suicides, i.e. the power of the study is low:

- 1) From 1995 to 2014 there has been no statistically significant change in the overall CAF Regular Force male suicide rates.
- 2) The rate of suicide when standardized for age and sex is not statistically significantly different from that of the general Canadian population.
- 3) Direct standardization suggests that a history of deployment is now emerging as a risk factor for Regular Force male suicide in the Canadian Armed Forces since 2010, confounding by other factors may be responsible for this finding.
- 4) High prevalence of mood disorders, spousal/intimate partner breakdown and/or of career-related proceedings may be indicators of heightened suicide risk in CAF Regular Force males.
- 5) Analyses suggest that there is a significantly higher crude rate of Regular Force male suicide in the Army Command relative to other CAF Commands. This may be in part driven by the significant difference in the crude Regular Force male suicide rate for the Combat Arms Trades relative to the non-Combat Arms suicide rate.
- 6) With more than 20 years of Regular Force data, advanced statistical approaches will need to be explored in future analyses to better and more accurately describe the suicide experience in the CAF.

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<sup>31</sup> Zamorski MA, Rolland-Harris E, Jetly R, Downes A, Whitehead J, Thompson J, Pedlar D. Military Deployments, Posttraumatic Stress Disorder, and Suicide Risk in Canadian Armed Forces Personnel and Veterans. *Can J Psychiatry*. 2015; 60(4):200.









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12. ABSTRACT (Brief and factual summary of the document.)

**Introduction:** The Directorate of Force Health Protection (DFHP) regularly conducts analyses to examine suicide rates and the relationship between suicide and deployment. This report is an update covering the period from 1995 to 2014.

**Methods:** This report describes crude suicide rates from 1995 to 2014, comparisons between the Canadian population and the CAF using standardized mortality ratios (SMRs), and suicide rates by deployment history using SMRs and direct standardization. It also examines variation in suicide rate by Command and, using data from the Medical Professional Technical Suicide Reviews (MPTSR), looks at the prevalence of other suicide risk factors in suicides which occurred in 2014.

**Results:** Between 1995 and 2014, there were no statistically significant increases in suicide rates. The number of Regular Force male suicides was not statistically different than that expected based on Canadian male suicide rates. While the male suicide rate among previously deployed personnel was not significantly higher than in comparable civilians, rate ratios indicated that there was a trend for those with a history of deployment to be at an increased risk of suicide compared to those who have never been deployed, however the difference was not statistically significant. These rate ratios also highlighted that being part of the Army Command increases the risk of suicide, relative to those who are part of the other Commands.

While past analyses had not shown an association between having been deployed and completed suicide, the most recent findings suggest a trend towards an elevated suicide rate ratio (1.48, CI: 0.98, 2.22) in the past decade in those Regular Force males with a history of deployment relative to those Regular Force males without a history of deployment. However, this finding fell just short of statistical significance. Regular Force males under Army Command were at significantly increased risk of suicide relative to Regular Force males under non-Army Commands (age-adjusted suicide rate ratio = 2.02, CI: 1.45, 2.61), with a trend towards a widening gap between the rates in Army and non-Army Command Regular Force males over the past five years. However, this appeared to be driven by lower than expected rates of suicide in Regular Force males under non-Army Commands relative to civilians rather than a significant rise in rates in Regular Force males under Army Command as these were similar to the suicide rates in civilians (SMR = 1.08, CI: 0.81, 1.41). Regular Force males under Army Command in the combat arms trades had statistically significantly higher suicide rates (30.35/100,000, CI: 23.03, 39.69) than non-combat arms Regular Force males (18.21/100,000, CI: 14.75, 22.54).

Results from the 2014 MPTSRs support the theory of a multifactorial causal pathway to suicide rather than a direct link between single risk factors (e.g. PTSD or deployment) and suicide.

**Conclusions:** Suicide rates in the CAF did not significantly increase over time, and after age standardization, they were not statistically higher than those in the Canadian population. However, small numbers have limited the ability to detect statistical significance. In contrast to previous results, history of deployment may be emerging as a risk factor for suicide in the CAF. The increased risk in Regular Force males under Army Command compared to Regular Force males under non-Army Command is another new finding. Deployment-related trauma (especially that related to the mission in Afghanistan) and resulting mental disorders are plausible mechanisms for these associations. However, residual confounding may also be at play (e.g., by disproportionate risk of childhood trauma or other lifetime trauma in Army personnel or those who deploy). Further research with other data sources will be needed to explore these hypotheses in depth.



**Introduction :** La Direction - Protection de la santé de la Force (DPSF) mène régulièrement des analyses afin d'examiner les taux de suicide et la relation entre le suicide et le déploiement. Le présent rapport constitue une mise à jour pour la période s'échelonnant de 1995 à 2014.

**Méthodes :** Le présent rapport décrit les taux bruts de suicide de 1995 à 2014, les comparaisons entre la population canadienne et les FAC au moyen des ratios standardisés de mortalité (RSM) et les taux de suicide chez les personnes ayant des antécédents de déploiement au moyen des RSM et de la normalisation directe. Il examine également la variation dans le taux de suicide en fonction du commandement et, au moyen de données tirées des Examens techniques des suicides par des professionnels de la santé (ETSPS), on s'est penché sur la prévalence d'autres facteurs de risque dans les suicides qui ont eu lieu en 2014.

**Résultats :** Entre 1995 et 2014, il n'y avait pas d'augmentation statistiquement significative des taux de suicide. Le nombre de suicides chez les hommes de la Force régulière n'était pas statistiquement différent du taux prévu en fonction des taux de suicide chez les hommes dans la population canadienne. Bien que le taux de suicide chez le personnel ayant fait l'objet d'un déploiement ne soit pas beaucoup plus élevé que chez la population civile comparable, les ratios de taux indiquaient que ceux qui ont des antécédents de déploiement présentaient une tendance statistiquement non significative de risque accru comparativement à ceux qui n'ont jamais fait partie d'un déploiement. Ces ratios de taux laissent aussi voir que le fait de faire partie du commandement de l'Armée de terre accroît le risque de suicide par rapport à ceux qui font partie d'un autre commandement. Bien que des constatations antérieures des FAC n'aient pas montré d'association entre le fait d'avoir été déployé et le suicide, les constatations les plus récentes laissent maintenant voir une tendance vers un ratio de taux de suicide ajusté élevé (1,48, IC : 0,98, 2,22) au cours de la dernière décennie chez ceux qui avaient des antécédents de déploiement comparativement à ceux qui n'en avaient pas. Toutefois, cette conclusion ne représentait pas tout à fait une importance sur le plan statistique. Le personnel de l'Armée de terre présentait un risque de suicide nettement accru par rapport aux autres militaires (ratio de taux de suicide ajusté en fonction de l'âge = 2,02, IC : 1,45, 2,61), et on note une tendance vers un élargissement de l'écart entre les taux du personnel de l'Armée de terre et ceux des autres militaires au cours des cinq dernières années. Cependant, cela semble être dû aux taux inférieurs à ce qui était prévu chez les militaires n'appartenant pas à l'Armée de terre comparativement aux civils, plutôt qu'à des taux élevés chez le personnel de l'Armée de terre (RSM = 1,08, IC : 0,81, 1,41). Le personnel mâle de l'Armée de terre faisant partie des métiers d'armes de combat présente des taux de suicide nettement plus élevés (30,35/100 000, IC : 23,03, 39,69) que ceux des autres membres de l'Armée de terre ne faisant pas partie des métiers d'armes de combat (18,40/100 000, IC : 14,75, 22,54). Les résultats des ETSPS de 2014 appuient la théorie d'un enchaînement de causalité qui est plus multifactoriel plutôt qu'un lien direct entre des facteurs de risques individuels (p. ex. l'ESPT ou le déploiement) et le suicide.

**Conclusions :** Les taux de suicide dans les FAC n'ont pas augmenté de façon marquée avec le temps, et ils ne sont pas plus élevés que ceux de la population canadienne lorsqu'ils sont normalisés selon l'âge. Toutefois, le nombre peu élevé de sujets pourrait avoir restreint la capacité à détecter une signification statistique. Comparativement aux résultats antérieurs, les antécédents de déploiement émergent désormais comme un facteur possible de risque de suicide dans les FAC. Le risque excessif au sein de l'Armée de terre est également une constatation nouvelle. Le trauma lié au déploiement (particulièrement celui lié à la mission en Afghanistan) et les troubles mentaux qui en découlent sont des mécanismes plausibles de ces associations. Cependant, un effet de confusion résiduel pourrait aussi entrer en jeu (p. ex., un risque disproportionnel provenant d'un traumatisme de l'enfance ou d'un autre traumatisme vécu chez le personnel de l'Armée de terre ou chez ceux qui sont déployés) d'autres recherches seront nécessaires pour étudier ces hypothèses en profondeur.



13. KEYWORDS, DESCRIPTORS or IDENTIFIERS (Technically meaningful terms or short phrases that characterize a document and could be helpful in cataloguing the document. Use semi-colons as delimiters.)

*suicide; Canadian Forces; rates; age-adjusted rate; standardized mortality ratio; rate ratio; deployment; Canadian population*