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Estimated Accident Risk for BasicMed vs. Medically Certified U.S. Pilots

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16. Abstract

Introduction: Safety information is lacking for the U.S. BasicMed flight rules in effect since May 1, 2017, which provide an alternative to formal aeromedical certification. The current study aims to compare the accident risk level for BasicMed pilots with third-class medically certified pilots.
Methods: BasicMed pilots, as of December 31, 2019, and a comparison group of pilots holding third-class medical certificates were matched to accidents in the National Transportation Safety Board's database and to reported flight hours and other certificate data in the Federal Aviation Administration's pilot medical database. After appropriate data exclusions to optimize the validity of the analysis, the study compared 28,904 BasicMed pilots and 110,400 third-class pilots. Accident proportions, person-time rates, and estimated rates per 100,000 flight hours were calculated. Accident odds ratios (ORs) were also computed and explored.
Results: The estimated overall accident rate per 100,000 flight hours for the BasicMed group was 7.3 (fatal: 1.6) compared to 7.0 (fatal: 1.4) for the medically certified pilots. The fatal accident rate per 100,000 flight hours was 1.6 for the BasicMed group and 1.4 for the medically certified pilots. The differences in overall and fatal accidents were not statistically significant. No statistically significant differences were found when multiple age subgroups were compared. Also, logistic regression models adjusted for relevant confounders revealed no significantly elevated accident ORs between the BasicMed and third-class certified pilot groups overall.
Conclusion: This study could not detect a significant overall difference in aviation safety outcomes, such as accident rates or ORs between BasicMed pilots and pilots holding third-class medical certificates. However, given the study's limitations, generalizations should not be made that because significant differences were not detected, no differences exist. The power to test the effect of medical certification changes might be insufficient due to the number of relatively recent flight exams in the BasicMed group. The results do provide some evidence that the BasicMed rules do not otherwise select for a risky group of pilots and that further research of the issue is warranted.

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INTRODUCTION

Recently, several countries have permitted increased flying privileges without the requirement for formal aeromedical certification. The latest example of this in the U.S. is with the BasicMed flight rules. The U.S. Congress mandated these rules in Section 2307 of the Federal Aviation Administration (FAA) Extension, Safety, and Security Act of 2016 (Pubic Law 114-190) enacted on July 15, 2016. The provisions of this law provide an alternative to the third-class medical certificate and allow most pilots to fly a wide assortment of general aviation (GA) aircraft without holding a medical certificate, provided they meet specific eligibility requirements. The FAA issued regulations implementing this legislation that became effective on May 1, 2017 (Alternative Pilot Physical Examination and Education Requirements, 2017). BasicMed pilots are limited to aircraft authorized under federal law to carry not more than six occupants with a maximum certificated takeoff weight of not more than 6,000 pounds. The aircraft may operate under visual flight rules or instrument flight rules, within the U.S., at lower than 18,000 feet altitude, not exceeding 250 knots, and may not be operated for compensation or hire.

Searches of the PubMed index for "BasicMed" and use of the search engine Google to search for "third class medical reform" returned no published studies that objectively addressed the safety impact of the BasicMed rule changes. There appear to be no published, peer-reviewed studies evaluating the overall safety effect of the BasicMed alternative certification pathway. However, we found two studies that address another alternative pathway for light sport aircraft (LSA) with reported safety measures. Ricaurte et al. (2016) compared the autopsy findings of pilots fatally injured in aircraft accidents who possessed valid third-class medical certificates with pilots flying legally without a valid medical certificate (i.e., sport pilots). The study considered autopsy findings as surrogate measures of safety risk and found evidence of more severe preexisting disease in the medically uncertified pilots by a value of 59% for sport pilots compared to 25% for third-class pilots ($p < .01$). Also, Mills and DeJohn (2016) calculated accident rates in LSA compared to GA aircraft and found a much higher risk in the LSA group: 29.8 accidents per 100,000 flight hours for LSA aircraft versus 12.7 accidents per 100,000 flight hours for GA aircraft ($p < .01$). This was intended to be another indirect measure of medically uncertified pilots since they would only be legally flying the LSA. Both of these studies were significantly limited by their inability to address possible confounding variables. However, they were intended to reflect on sport pilot accident risk—the comparative safety for pilots with a third-class medical certificate versus pilots with an alternative certification pathway. Despite their limitations, these studies provide evidence of the possibility of significantly higher accident risk in flight due to alternative certification conditions.

There has been much interest in the aviation community as to how BasicMed affects aviation safety. Congress also legislatively mandated the FAA and the National Transportation Safety Board (NTSB) prepare a report before the five-year point of the BasicMed rule changes, with details regarding BasicMed's impact on aviation safety in the National Airspace System (FAA Extension Safety and Security Act, 2016). The purpose of the current study is to answer this specific question: is the risk of accidents higher for BasicMed pilots than for third-class medically certified pilots? The null hypothesis is that BasicMed pilots and third-class medically certified pilots have an equivalent risk for both "all accidents" and "only fatal accidents" categories using accident proportions, person-year accident rates, and accident rates per 100,000 flight hours. The alternative hypothesis is that the BasicMed's pilots' proportions/rates of accidents are different from those of the third-class medically certified pilots' proportions/rates of accidents. We also compared accident characteristics and probable causes BasicMed pilots and third-class medically certified pilots to add context to the results.

METHODS

Institutional Review Board Protocol

The FAA's Institutional Review Board (protocol #19032) approved this study in advance.

Study Sample

Pilots who wish to fly under the BasicMed rules must undergo a physical exam by a community physician and complete an online education course. The online course collects information regarding the physical exam and transmits the course and physical exam data to the FAA's Airman Certification Database (FAA, 2020a). A list of all pilots in the Airman Certification Database with BasicMed entries from May 1, 2017, through December 31, 2019, was obtained via the FAA's Aviation Safety Information Analysis and Sharing System. This date range covered the 32 months that BasicMed operations were in effect.

The FAA maintains pilot medical data in the Office of Aerospace Medicine's Document Imaging Workflow System (DIWS) (FAA, 2020b). The list of BasicMed pilots was matched to DIWS and included information regarding most recent exam dates, expiration dates, certificate class, certificate issuance, gender, reported total and previous six-month flight hours, body mass index, date of birth (DOB), and special issuance status. The same data were obtained for all non-BasicMed pilots applying for a third-class medical certificate since May 1, 2017, for comparison.

The NTSB investigates U.S. aviation accidents and maintains an extensive database of their findings (NTSB, n.d.). The files of BasicMed pilots and comparison pilots were matched to the NTSB database as of April 1, 2020. As of December 31, 2019, accidents would likely be captured with only rare exceptions, and the proportion of any unmatched accidents would likely be similar for the BasicMed and medically certified pilots. The NTSB number, accident date, fatality status, and accident characteristics such as light condition, basic weather condition, homebuilt status, type of flying, presence of a second pilot, and phase of flight were extracted from the NTSB database for all relevant accidents. Probable and contributory causes were also extracted for the accidents with available final reports.

Exclusion criteria for the primary analysis included the following:

- BasicMed pilots were limited to those with their last FAA exam more recent than April 30, 2012. This criterion was imposed to improve the reliability of the flight times reported by the BasicMed pilots at their last FAA exam by limiting this interval to five years before BasicMed implementation, which is the same range as the longest medical certificate validity interval.
- All pilots were limited to those with issued third-class certificates at their last FAA exam. First- and second-class exams have large reported flight times associated with commercial flying, which has a much lower accident risk. However, most of their accidents occur during personal GA flying. There is no way to estimate the flight hours associated with personal flying for these pilots.

- All exams were limited to no more than 40,000 reported total flight hours and no more than 600 estimated annual flight hours. These outliers are almost always erroneous, and even a small number could distort the analysis.
- All pilots were limited to estimated annual flight hours greater than zero. There are accidents associated with these exams, but the actual flight hours are entirely unknown, and inclusion would falsely elevate the calculated accident rates.
- Pilots with a BasicMed date also holding a valid medical certificate were excluded from both groups.

Study Design

The authors conducted a retrospective cohort analysis of BasicMed pilots versus pilots with third-class medical certificates. The study period was from the BasicMed program initiation date (i.e., May 1, 2017) through December 31, 2019. Before applying the exclusion criteria, the BasicMed cohort consisted of all pilots who qualified to operate under BasicMed rules any time from May 1, 2017, through December 31, 2019. The third-class medically certified cohort consisted of anyone issued a third-class medical certificate from May 1, 2017, through December 31, 2019, before applying the exclusion criteria. The only censoring within these cohorts occurred due to death in a fatal aviation accident, as reported in the NTSB database. Pilots involved in nonfatal aviation accidents were not censored.

Variables

Dependent Variables

- <u>Accident occurrence:</u> This assessed whether an accident occurred during the study period (NTSB, n.d.).
- <u>Fatal accident occurrence:</u> This assessed whether a fatal accident occurred during the study period (NTSB, n.d.).
- <u>Accident proportion:</u> This measured the proportion of accidents for the group in question. We derived accident proportion from the number of accidents (NTSB, n.d.) for pilots in the group in question divided by the number of pilots in the group in question.
- <u>Fatal accident proportion:</u> This measured the proportion of fatal accidents (NTSB, n.d.) for the group in question. We derived the fatal accident proportion from the number of fatal accidents for pilots in the group in question divided by the number of pilots in the group.
- <u>Person-year accident rate:</u> This was an assessment of the rate of accidents per total time contributed by the group in question. We derived the person-year accident rate from the number of accidents (NTSB, n.d.) for pilots in the group in question divided by the total time contributed by the group in question.
- <u>Person-year fatal accident rate:</u> This was an assessment of the rate of fatal accidents per total time contributed by the group in question. We derived the person-year fatal accident rate from the number of fatal accidents (NTSB, n.d.) for pilots in the group in question divided by the total time contributed by the group in question.
- <u>Flight time accident rate:</u> This was a measure of the rate of accidents per 100,000 hours of flight. We derived flight time accident rate from the number of accidents (NTSB, n.d.) for pilots in the group in question divided by the total estimated flight hours contributed by the group in question.

Previous studies have used this source of flight time data with reasonable results (Broach et al., 2003; Kay et al., 1994; Mills et al., 2018).

- Flight time fatal accident rate: This was a measure of the rate of fatal accidents per 100,000 hours of flight. We derived the flight time fatal accident rate from the number of fatal accidents (NTSB, n.d.) for pilots in the group in question divided by the total estimated flight hours contributed by the group in question.
- Accident characteristics: We recorded accident characteristics, including light conditions, basic weather conditions, homebuilt status, type of flying, presence of a second pilot, phase of flight, and probable cause (if available) (NTSB, n.d.).

Independent Variable

- BasicMed status: We recorded whether the pilot was BasicMed or third-class medically certified according to the Airman Certification Database (FAA, 2020a) and the DIWS Database (FAA, 2020b).

Covariates

- Age: We recorded pilot age in years as of December 31, 2019, according to the pilot's DOB in the DIWS Database (FAA, 2020b).
- Gender: We recorded the pilot's gender as noted in the DIWS database (FAA, 2020b).
- Total flight time: We recorded the total flight time as of the pilot's last medical exam according to the DIWS database (FAA, 2020b).
- Special issuance: We noted special issuance status per the pilot's last medical exam according to the DIWS database (FAA, 2020b).
- Estimated flight hours: We estimated total flight hours for the group in question derived by first estimating annual flight time based on six months of flight time reported on each pilot's previous two medical exams (if only one exam was available, we recorded the single exam twice). We calculated estimated flight hours by multiplying total time in years by estimated annual flight time hours.

Statistical Analysis

Tests for Descriptive Statistics

The calculated proportions, person-time accidents rates, and estimated accident rates per 100,000 flight hours in pilot groups of interest were compared for statistically significant differences using the chi-square test except where a count was less than five. In these cases, we used Fischer's exact test. Chi-square tests and medians tests were used to compare descriptive parameters for statistically significant differences.

Logistic Regression Tests

Logistic regression models were used to determine odds ratios (ORs) for the association of BasicMed status with aircraft accidents. The outcome variable was the occurrence of an aircraft accident; the predictor variables included age, gender, total flight time, special issuance status, and hours of flight exposure in addition to BasicMed status. Because a unit size of one for the quantitative predictor variables would result in minuscule ORs, a unit size of 10 years was used for age, 100 hours for flight hours exposure, and 100 hours for reported total flight time to scale the ORs to an understandable, practical level.

Descriptive statistics, logistic regression, and chi-square testing were performed using IBM SPSS Statistics for Windows, Version 21.0. (Armonk, NY: IBM Corp.) and replicated using Mathematica Version 11.1 (Champaign, IL: Wolfram Research). A statistical significance level of $\alpha = .05$ was used. Power calculations were carried out with G*Power Version 3.1 (Kiel, DE: Franz Faul Univ.).

RESULTS

Figure 1 provides details of the process used to select the final BasicMed and third-class medical exam cohorts based on the exclusions described in the Methods section. The final BasicMed cohort consisted of 28,906 exams, while the final third-class cohort consisted of 110,400 exams.

Figure 1. *Final Results for Cohorts After Exclusions*

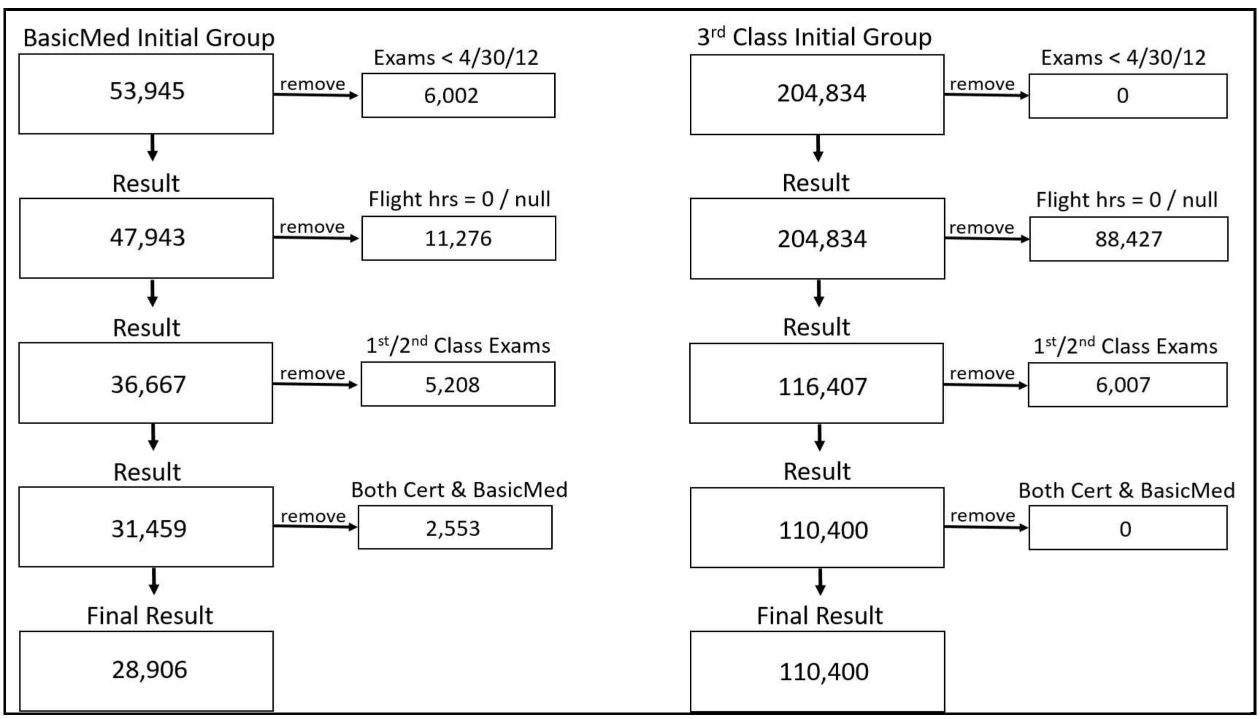

Table 1 presents the descriptive statistics for the pilots used in the primary analysis. The BasicMed characteristics of this sample are similar to the whole BasicMed population described in the Introduction.

Table 1. *Descriptive Statistics for BasicMed and Third-Class*

	BasicMed	Third-Class
Age as of 12/31/2019 (years)	67.2	56.7
Gender		
Women (%)	3.1	6.1
Men (%)	96.9	93.9
BMI (kg/m^2)	27.8	27.1
Reported total flight time (hours)	820.0	384.0
Reported past six-month flight time (hours)	18.0	15.0
Estimated Annual Flight Time (hours)	36.0	30.0
Special Issuance (%)	27.8	10.5
Years from FAA exam to 12/31/19	4.0	1.8
Years from FAA exam to accident	2.9	.6
Number of Accidents	190	486
Number of fatal Accidents	41	95
Number of Exams	28,906	110,400
Number of Pilots	28,904	95,305

Note. The median value is reported for all continuous parameters. The difference between all continuous and percent variables is statistically significant at $p = .05$. A total of 15,095 of the third-class pilots had more than one exam. BMI = body mass index; FAA = Federal Aviation Administration.

Table 2 presents the calculated accident proportions, person-year rates, and estimated accident rates per 100,000 hours and *p*-values for the analysis group described in Table 1.

Table 2. *Calculated Accident Proportions (per 1000), Person-Year Rates (per 1000), and Estimated Accident Rates per 100,000 Flight Hours*

Group	Variable	----- All Accidents ----- BasicMed All	Third-Class All	*p*	----- Fatal Accidents ----- BasicMed Fatal	Third-Class Fatal	*p*
Overall	Proportion[a]	6.57	4.40	<.01	1.42	.86	.01
	Person-Year[b]	3.65	3.62	.93	0.79	.71	.57
	Accident Rate[c]	7.32	7.04	.66	1.58	1.38	.46
Age <40 years	Proportion	4.29	2.25	.36	.00	.35	.69
	Person-Year	2.96	1.83	.54	.00	.28	.66
	Accident Rate	10.15	6.53	.50	.00	1.00	.66
Age 40 to 49 years	Proportion	5.30	3.66	.30	.00	.65	.29
	Person-Year	3.39	3.07	.78	.00	.55	.23
	Accident Rate	8.31	6.03	.37	.00	1.08	.28
Age 50 to 59 years	Proportion	4.36	4.08	.77	1.52	.64	.04
	Person-Year	2.58	3.38	.24	.90	.53	.21
	Accident Rate	5.29	5.74	.72	1.84	.90	.09
Age 60 to 69 years	Proportion	6.23	5.15	.21	1.09	.99	.79
	Person-Year	3.48	4.22	.20	.61	.81	.42
	Accident Rate	6.85	7.05	.84	1.20	1.35	.73
Age 70 to 79 years	Proportion	7.12	7.19	.95	1.45	1.92	.40
	Person-Year	3.75	5.88	<.01	.76	1.57	.03
	Accident Rate	7.33	9.91	.06	1.49	2.65	.08
Age ≥ 80 years	Proportion	12.30	7.74	.10	3.82	1.76	.15
	Person-Year	6.22	6.30	.97	1.93	1.43	.59
	Accident Rate	12.02	11.71	.93	3.73	2.66	.54

[a]Accident proportion per 1,000. [b]Person-year rates per 1,000. [c]Estimated accident rates per 100,000 flight hours.

The hypothesis tests did not show a statistically significant difference between the BasicMed and third-class certificate holders for the estimated accident rates or fatal accidents. We also found no significant difference for any accident or fatal accident rates according to pilot age. The results were the same for person-year accident rates except the 70- to 79-year-old group, which showed significant differences for all accidents and fatal accidents. The tests showed significant differences for overall accident proportions and overall fatal accident proportions. However, none of the accident proportions by age group differed significantly except for the 50- to 59-year-old group for fatal accidents.

We used a logistic regression model to adjust for the confounding effects of age per 10 years, gender, presence of a special issuance waiver, exposure hours per 100 hours, and total pilot time per 100 hours. Table 3 presents the results of the logistic regression model.

Table 3. *Results of Adjusted Logistic Regression Model for Accidents*

Predictor Variable in Model	OR	95% CI	*p*
BasicMed (compared to third-class)	1.09	.91 - 1.30	.36
Age (per 10 years)	1.25	1.18 - 1.33	<.01
Flight hours exposure (per 100 hours)	1.33	1.28 - 1.39	<.01
Gender (men compared to women)	1.51	.96 - 2.36	.07
SI waiver (compared to no waiver)	0.97	.79 - 1.20	.81
Total pilot time (per 100 hours)	1.00	1.00 - 1.00	.17

Note. The result for each predictor variable was adjusted for the effect of other predictor variables. Units for continuous covariates were chosen to improve clarity. This model included 675 accidents and 139,300 cases (six missing cases). CI = confidence interval; OR = odds ratio; SI = special issuance.

The effects of gender, special issuance status, and total flight time were not significant. The ORs and *p*-values in the model containing only BasicMed status, age, and flight hours of exposure are essentially the same as in the full model above. BasicMed status is not associated with accidents and has an OR point estimate of only 1.09. The fit of the parsimonious model was acceptable with the Hosmer-Lemeshow ($p = .15$). None of the logistic models for age subgroups returned a statistically significant effect for BasicMed status.

When the same covariates as above are included in the adjusted logistic regression, BasicMed was also not associated with fatal accidents with OR = 1.05 (95% CI: 0.72 -1.55, $p = .80$). Model fit was acceptable with Hosmer-Lemeshow $p = .18$. A logistic regression model for only the 50- to 59-year-old group shows that BasicMed status is significantly associated with accidents after adjusting for age and exposure flight time (OR = 2.32; CI 1.01 - 5.34, $p = .05$). This model included 26 accidents and 32,530 pilots. A sensitivity analysis shows that this result is weak given that if even one BasicMed accident is removed, the OR is no longer significant with $p = .10$. None of the logistic models for other age ranges returned a statistically significant effect for BasicMed status. Table 4 shows no significant difference in either accident rate or fatal accident rate between the BasicMed and Third-class cohorts at the 5% level. As seen in Table 5, there were also no significant differences in accident OR for either overall accidents or fatal accidents at the 5% level.

Table 4. *Summary of Primary Results – Chi-square Hypothesis Tests*

Dependent Variable	BasicMed	Third-Class	*p*
Accident proportion	6.57	4.40	<.01
Fatal accident proportion	1.42	.86	.01
Person-year accident rate	3.65	3.62	.93
Person-year fatal accident rate	.79	.71	.57
Accident rate per 100,000 flight hours	7.32	7.04	.66
Fatal accident rate per 100,000 flight hours	1.58	1.38	.46

Table 5. *Summary of Primary Results – Logistic Analyses*

Outcome Variable	Predictor Variable	Odds Ratio	95% CI	p
Accident rate	BasicMed vs third-class	1.09	.91 - 1.30	.36
Fatal accident rate	BasicMed vs third-class	1.05	.72 – 1.55	.80

Note. CI = confidence interval.

We explored accident characteristics and probable/contributory cause findings using only the limitation that the last FAA medical exam resulted in issuing a third-class certificate and excluding the BasicMed pilots who also hold valid third-class certificates. This resulted in 234 BasicMed accidents and 642 third-class accidents.

- BasicMed accidents were twice as likely to involve homebuilt aircraft as the pilots holding third-class medical certificates (27.8% BasicMed vs. 11.8% third-class, $p < .01$).
- BasicMed accidents were more likely to involve personal flying (89.7% BasicMed vs. 73.7% third-class, $p = .01$).
- BasicMed accidents were less likely to involve flight instruction (6.4% BasicMed vs. 20.7% third-class, $p < .01$).
- BasicMed accidents were less likely to have a second pilot (12.4% BasicMed vs. 19.8% third-class, $p = .01$).

Accident characteristics were also explored separately for fatal accidents in the 50- to 59-year-old age group to help understand the marginally significant elevated fatal accident OR for BasicMed pilots in this age group. We found for BasicMed and third-class groups that 38% vs. 12% were flying homebuilt aircraft, respectively, 100% vs. 82% were personal flying, and 13% vs. 35% had a second pilot. This age group was associated with higher risk flying activity in all these areas than the overall BasicMed group or the third-class certificated pilots in this age group.

Personnel-related NTSB probable/contributory cause finding for the 601 accidents with final reports (395 third-class and 206 BasicMed accidents) were not significantly different between the BasicMed and third-class groups. These broad categories included action (e.g., delayed, forgotten, incorrect), aircraft control, attention, maintenance, planning, use of equipment, and undetermined. The NTSB identified no accidents with a preexisting medical condition as a probable or contributory cause.

DISCUSSION

This study aimed to explore the safety experience of pilots flying under the BasicMed rules compared to pilots holding valid third-class FAA medical certificates. Specifically, this study was conducted to test the hypotheses that accident proportions, person-year accident rates, and accident rates per 100,000 flight hours would be the same for BasicMed pilots and for third-class medically certified pilots against the alternatives that BasicMed pilots proportions/rates were different. This study also tested the hypothesis that logistic regression would show that BasicMed pilots had equal odds of accident rates per 100,000 flight hours and that these would be true for all accidents and fatal accidents.

The tests did not reject the null hypotheses in favor of the alternative except in a few cases. The tests did not reject the null hypotheses for both overall accident rates and overall person-year accident rates (for all accidents and fatal accidents only). However, the tests rejected the nulls for accident proportions for all accidents and fatal-only accidents. The only age-specific hypothesis rejections were for the 70- to 79-year-old band for person-year rates (for all accidents and fatal-only) and the 50- to 59-year-old band for fatal-only accident proportions.

These results are not entirely consistent with the previous studies that address accident risk differential between medically certified and nonmedically certified pilots. Ricaurte et al. (2016) compared autopsy findings of medically certified pilots to pilots flying without a valid medical certificate found that the medically certified group had significantly fewer preexisting conditions, which the study considered a surrogate measure of accident risk. Mills and DeJohn (2016) compared accident risk per flight hour of LSA (i.e., nonmedically certified) pilots to medically certified pilots and found that the medically certified group had a significantly lower accident per flight hour rate than the LSA group. While Ricaurte et al. (2016) measured the proportion of pilots with and without preexisting conditions, with results that are, therefore, more comparable to and in agreement with the accident proportions of this study, Mills and DeJohn (2016) measured accident rates per flight hour, and their findings contrast with the results of this study.

Ideally, this study would have resolved the question of differential accident risk between medically certified and BasicMed pilots. Additionally, while most of this study's results point to an answer of no difference, there are both inconsistencies in the results and limitations with the available data that would prevent a conclusive answer. Conclusions based on the accident proportions, person-year accident rates, and accident rates per flight hour would conflict. In addition, the significantly larger accident proportion of the BasicMed group is not reflected when the groups are disaggregated by age. In no age group is the BasicMed all accident proportion greater than that of the third-class medically certified group. This inconsistency points to possible confounding by age in the overall accident proportion measure. If the methodology used for one of these three types of results were superior, an argument could be made for that set of results. However, each of the three has limitations.

While the accident proportions metric requires few assumptions, it does not provide a useful measure of exposure to accident risk (i.e., the risk of an accident while engaged in flying an aircraft). This is because its measure of exposure is the simple count of pilots in each category (i.e., BasicMed or third-class medically certified), and this measure would use a pilot with no flying hours and a pilot with many flying hours identically in the accident proportion calculation. To be effective as an accurate measure of accident risk, this metric would require two assumptions: that every pilot in each category has been a member of that category for the same number of years and that all pilots fly the same number of hours per year. While the person-year accident rate metric eliminates one of those assumptions (it does not assume that every pilot in each category has been a member of that category for the same number of years), it does make the unwarranted assumption that all pilots fly the same number of hours per year. Table 1 shows that BasicMed pilots reported 20% more annual flight time than the third-class medically certified pilots. The accident rate per flight hour eliminates both assumptions. However, to calculate the number of flight hours for a pilot, the accident rate per flight hour relies on two other assumptions: that the previous six-month flight hours a pilot reports for the pilot's medical exam is an accurate surrogate for actual hours flown the past six months and that the hours flown the past six months is representative of hours flown throughout the study period.

There were two other significant limitations of this study. First, we had to limit the pilots in the analysis to those with relatively recent FAA medical certificates and those with previous third-class medical certificates. This limitation allowed us to obtain more reliable demographic and flight hour data for BasicMed pilots. The second significant limitation was the relatively small sample size of accidents BasicMed pilots, given that there were no such pilots before May 1, 2017. The usefulness of this analysis to assess the safety effect of eliminating the requirement for a valid FAA medical certificate is limited by the relatively short median time (2.9 years) between the last FAA exams and accidents for the BasicMed pilots.

Further investigation of the accident rate difference between BasicMed and third-class medically certified pilots would benefit from access to demographic (especially flight time) data for BasicMed pilots similar to that available for third-class pilots. Additional research would also benefit from a larger sample of BasicMed pilots, as more have been flying for several years. This study was undertaken at the 32-month point for the BasicMed rules period. We recommend additional safety studies be performed as the BasicMed group evolves and the amount of time since their last FAA medical exams becomes long enough to detect a possible effect from the lack of formal aeromedical certification. The results of this study do provide some assurance that the BasicMed rules do not have an unintended effect of selecting accident-prone pilots, but that assurance is not conclusive.

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