Enrollment Snapshot of Radiography, Radiation Therapy and Nuclear Medicine Technology Programs - 2018
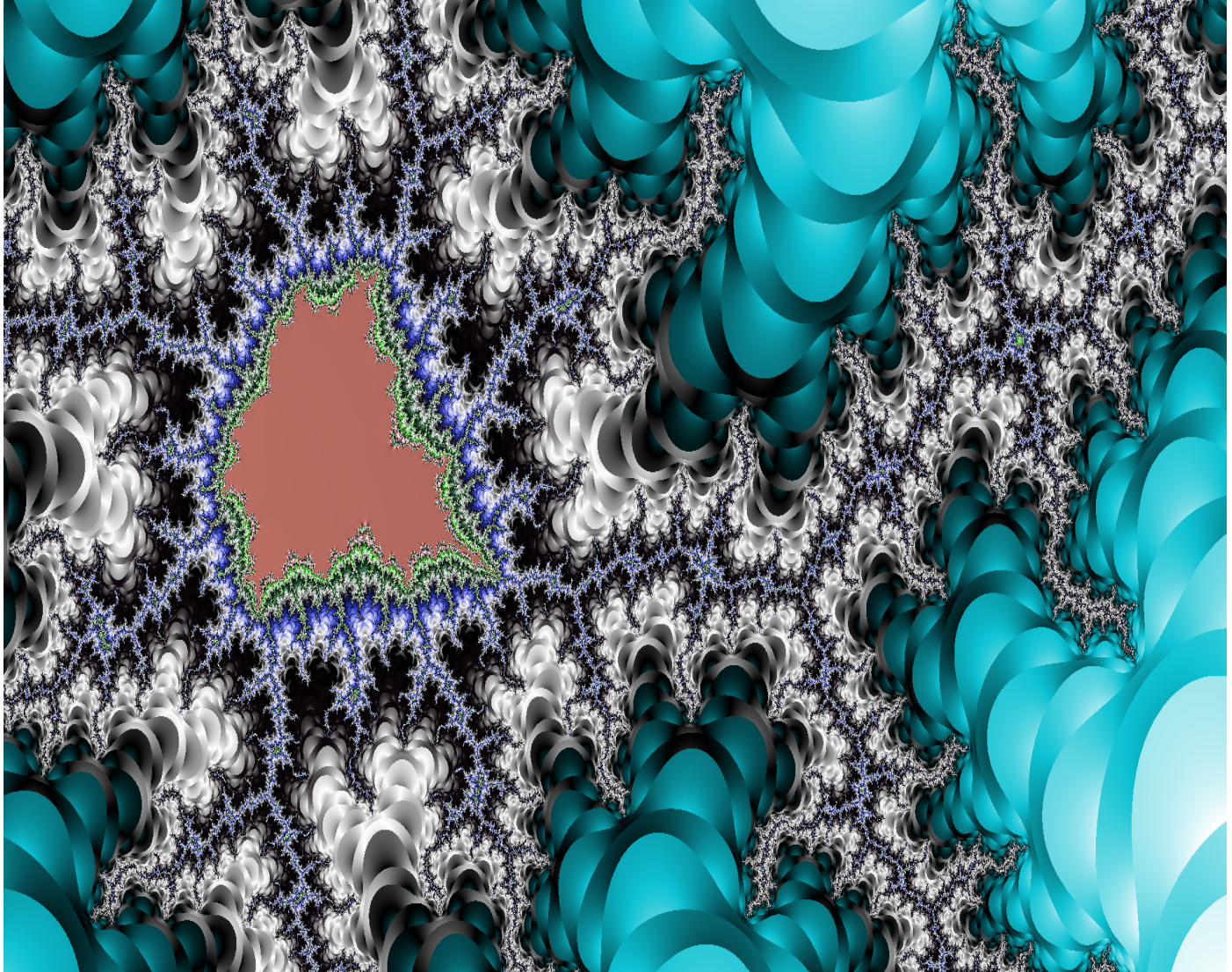
January 2019

asrt

American Society of Radiologic Technologists

Table of Contents

Executive Summary

In early October 2018, an invitation to complete an online questionnaire was sent via email to 956 radiography, radiation therapy, and nuclear medicine technology educational programs listed by the American Registry of Radiologic Technologists (ARRT). At the close of the survey in early December 2018, a total of 377 responses had been received, yielding an overall response rate of 39.6%.

	Return	Population	Percent Sampled	Margin of Error at the 95% Level
Radiography	298	730	40.8%	±4.4%
Radiation Therapy	41	109	37.6%	±12.1%
Nuclear Medicine	27	117	23.1%	±16.6%
Overall	**377**	**956**	**39.4%**	**±3.9%**

This report summarizes findings regarding radiologic sciences enrollment in ARRT-recognized programs based on the responses from program directors.

Demographic Analysis

The largest group of respondents (37.2%) work at a community college or 2-year institution, 30.3% work at a university or 4-year institution, 17.8% work at a medical center, 9.3% work at a technical college, and 5.3% work at a for-profit school.

Most programs that responded to the survey are in radiography (79.0%); of the remaining respondents, 10.9% were radiation therapy, 7.2% were nuclear medicine, and 2.9% were other types of imaging programs.

The terminal degree granted by programs responding to the survey was most likely to be an associate degree (60.7% of respondents); 26.8% grant a bachelor's degree, and the remaining 12.5% grant another type of terminal degree.

The vast majority of programs surveyed (96.8%) are located in the United States; 2.7% are in Canada, and 0.5% are in Australia.

The US regions with the highest response rates were South Atlantic and East North Central, with a response rate of 20.7% and 20.4%, respectively. The lowest response rates were in New England and East South Central at 5.5% for each.

Enrollment Analysis

Based on the survey response, radiography programs enrolled an average of 22.4 students in 2018. This represents an increase of 0.7 students per program from 2017. This produces an overall estimate of 16,374 students entering ARRT-certified radiography programs in 2018, up from 15,769 in 2017.

On average, radiation therapy programs enrolled 12.4 students in 2018. This represents an increase of 1.9 students per program from 2017, when on average, 10.5 students enrolled in each radiation therapy program. This produces an overall estimate of 1,356 students enrolling in ARRT-certified radiation therapy programs in 2018, up from 1,151 in 2017.

On average, nuclear medicine programs enrolled 11.0 students in 2018. This represents a slight increase of 0.1 students per program from 2017, when on average, 10.9 students enrolled in each nuclear medicine program. Overall, this produces an estimate of 1,287 students enrolling in nuclear medicine programs in 2018, up from 1,273 in 2017.

2017 Student Capacity

Asked whether their program is currently at full enrollment, 56.7% of radiography programs, 56.1% of radiation therapy programs, and 40.7% of nuclear medicine programs said that they are at capacity. There were no statistically significant differences between groups.

Programs not at full enrollment were asked how many additional students their program could accommodate. On average, radiography programs said they could accommodate an additional 7.1 students, radiation therapy programs said they could accommodate an additional 7.7 students, and nuclear medicine programs said they could accommodate an additional 11.0 students.

This produces an estimate of 2,235 additional students across all radiography programs, 369 additional students across all radiation therapy programs, and 761 additional students across all nuclear medicine programs.

The mean number of qualified students turned away by radiography programs was 26.6, while radiation therapy programs turned away an average of 29.0 qualified students, and nuclear medicine programs turned away an average of 8.8 qualified students.

This produces an estimate of 11,002 qualified students turned away in radiography, 1773 turned away by therapy programs, and 418 turned down by nuclear medicine programs.

Near-term Changes
Most of the programs surveyed plan to maintain their current levels of enrollment; 81.1% of programs across disciplines plan to keep their enrollment at the same level; 16.7% of programs plan to increase enrollment, and the remaining 2.2% plan to decrease their enrollment.

In radiography, 82.5% of programs plan to maintain current enrollment; 15.8% plan to increase their enrollment, and the remaining 1.7% of programs plan to decrease their enrollment. There were no significant differences between groups.

In radiation therapy, 80.5% of programs plan to keep their current enrollment; 14.6% are planning an increase, and 4.9% plan to decrease enrollment.

In nuclear medicine, 66.7% of programs plan to leave their enrollment unchanged, 29.6% are planning an increase, and 3.7% plan to decrease their enrollment.

The majority of programs across disciplines (84.1%) will definitely continue to operate; 14.8% will most likely continue operations, and the remaining 1.1% will definitely close. There were significant differences between groups.

In radiography, 87.2% of programs said they would definitely continue to operate; 12.2% will most likely continue operation, and the remaining 0.7% will definitely close.

In radiation therapy, 70.7% of programs will definitely continue to operate, 24.4% will most likely continue operations, and the remaining 4.9% of programs will definitely close.

In nuclear medicine, 70.4% of programs will definitely continue to operate and the remaining 29.6% will likely continue to operate.

Program Outcomes
Asked about the attrition rate[1] of their program, respondents indicated that, on average:
- 15.0% of students in radiography programs failed to complete their course of study.
- 9.4% of students in radiation therapy programs failed to complete their course of study.
- 8.1% of students in nuclear medicine programs failed to complete their course of study.

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[1] Methodological Note: In previous years, no attempt was made to determine the plausibility of responses about attrition. The last two years responses were recoded according to the following scheme: If the respondent indicated an attrition rate of 59% or lower, the response was left as is. If the respondent indicated an attrition rate over 59%, the response was recoded as (1-x) where x = *uncoded user response*. For this reason, reported attrition means on the last two Enrollment Snapshots will be noticeably lower than they have been in previous years.

Comparing Canadian and U.S. Programs

For radiography, the mean entering class size was larger in Canada than in the United States. On average, 29.8 students entered Canadian programs, compared with an average of 22.1 students entering programs in the United States. In radiation therapy, U.S. programs enrolled more students than their Canadian counterparts, with 11.9 entering students in the U.S. compared with 9.7 in Canada. Nuclear Medicine programs in the United States enrolled an average of 10.5 students; the sole responding program from Canada enrolled 24.0 students.

Based on the survey responses, the calculated mean entering class size, and the total number of programs, the estimated total enrollment for each discipline is:

- Radiography: 15,484 in the United States and 626 in Canada.
- Radiation therapy: 1,061 in the United States and 145 in Canada.

Canadian radiography programs were more likely to be at full enrollment than their U.S. counterparts: 83.3% of Canadian radiography programs were at full enrollment, compared with 56.2% of U.S. programs. In radiation therapy, 59.5% of U.S. programs and no Canadian programs were at capacity. In Nuclear Medicine, 38.5% of U.S. programs were at full capacity, as was the only responding Canadian program.

Glossary

The following statistical results are displayed using a common set of acronyms and symbols for brevity. The symbols and acronyms used are listed here for reference.

N
Number of responses.

Valid Percent
Percentage of total responses.

Mean
The arithmetic average.

Population
The total number of programs.

SD
Standard Deviation.

X^2
Chi-squared, from Pearson's Chi-Squared to test for statistical significance.

F
F-statistic, from analysis of Variance (ANOVA) to test for statistical significance.

P
Probability, as a measure for statistical significance when $P \leq 0.05$.

Demographics

Indicate your program type.

	N	Valid Percent	Population Distribution	Sample Return as Percent of Population
Radiography	298	79.0%	727	41.0%
Radiation Therapy	41	10.9%	109	37.6%
Nuclear Medicine Technology	27	7.2%	117	23.1%
Other	11	2.9%	n/a	n/a
Total	**377**	100.0%	**953**	**39.6%**

Indicate your program type.
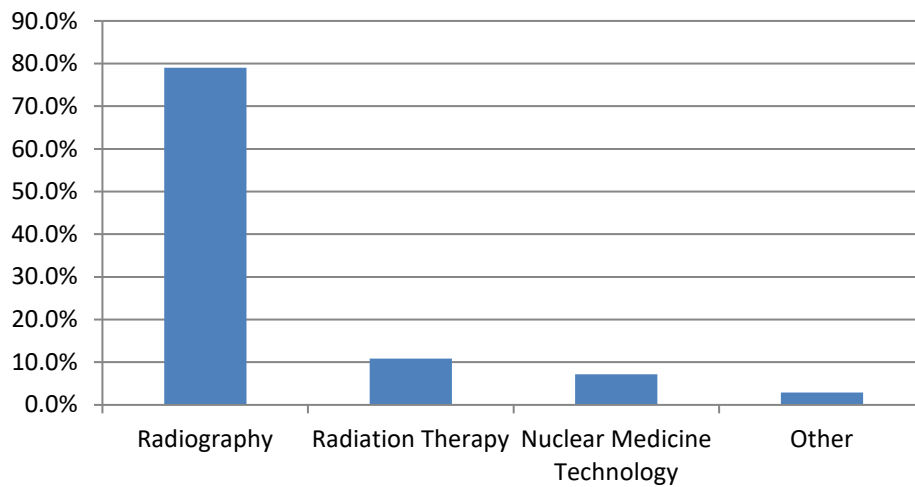
What is your primary place of employment?

	N	Valid Percent
Community college or two-year institution	140	37.2%
University or four-year institution	114	30.3%
Medical center	67	17.8%
Technical college	35	9.3%
For-profit school	20	5.3%
Other	0	0.0%
Total	**376**	100.0%

What is your primary place of employment?
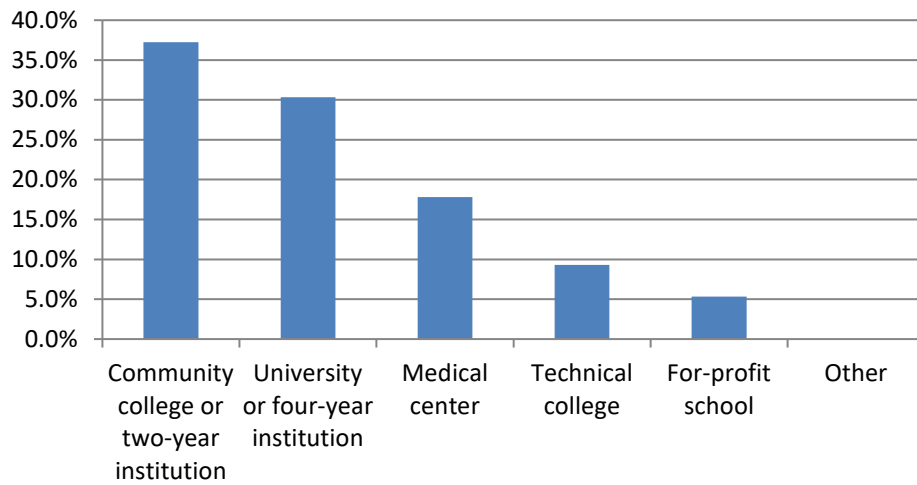
What is the terminal degree earned by the graduates in your program?

	N	Valid Percent
Associate degree	229	60.7%
Bachelor's degree	101	26.8%
Other	47	12.5%
Total	**377**	100.0%

What is the terminal degree earned by the graduates in your program?
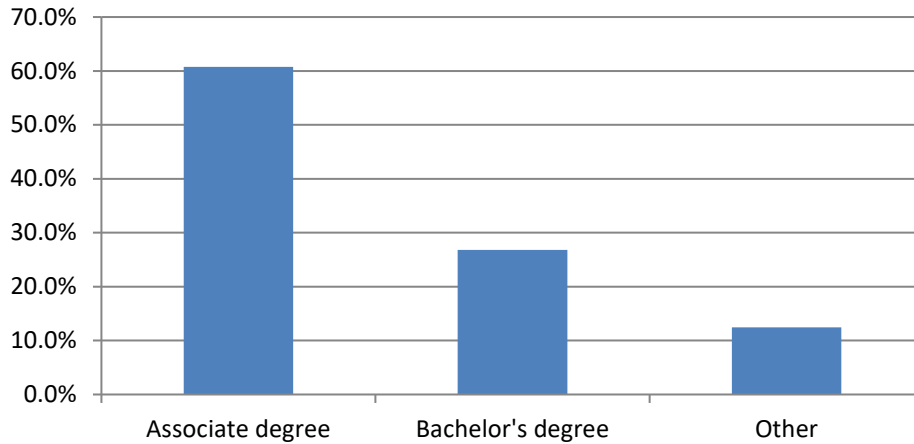
In what country is your program located?

	N	Valid Percent
United States	364	96.8%
Canada	10	2.7%
Australia	2	0.5%
Total	**376**	100.0%

In what country is your program located?
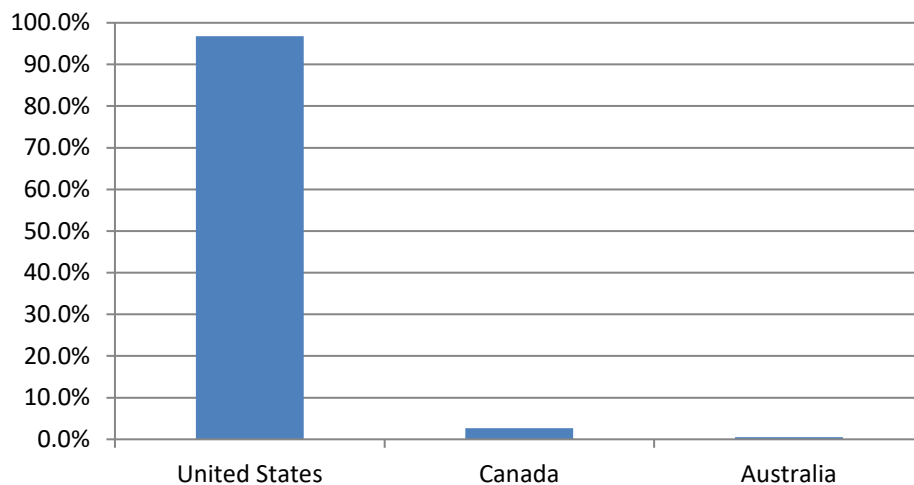
2018 Enrollment Snapshot

If you chose the United States in the question above, please indicate in which region your program is located.

	N	Valid Percent
South Atlantic (DE, MD, DC, VA, WV, NC, SC, GA, FL, PR)	75	20.7%
East North Central (WI, MI, IL, IN, OH)	74	20.4%
Mid-Atlantic (NY, PA, NJ)	47	12.9%
West North Central (ND, SD, NE, KS, MN, IA, MO)	40	11.0%
West South Central (OK, TX, AR, LA)	30	8.3%
Mountain (ID, MT, WY, NV, UT, CO, AZ, NM)	30	8.3%
Pacific (AK, WA, OR, CA, HI)	27	7.4%
New England (ME, NH, VT, MA, RI, CT)	20	5.5%
East South Central (KY, TN, MS, AL)	20	5.5%
Total	**363**	100.0%

If you chose the United States in the question above, please indicate in which region your program is located.
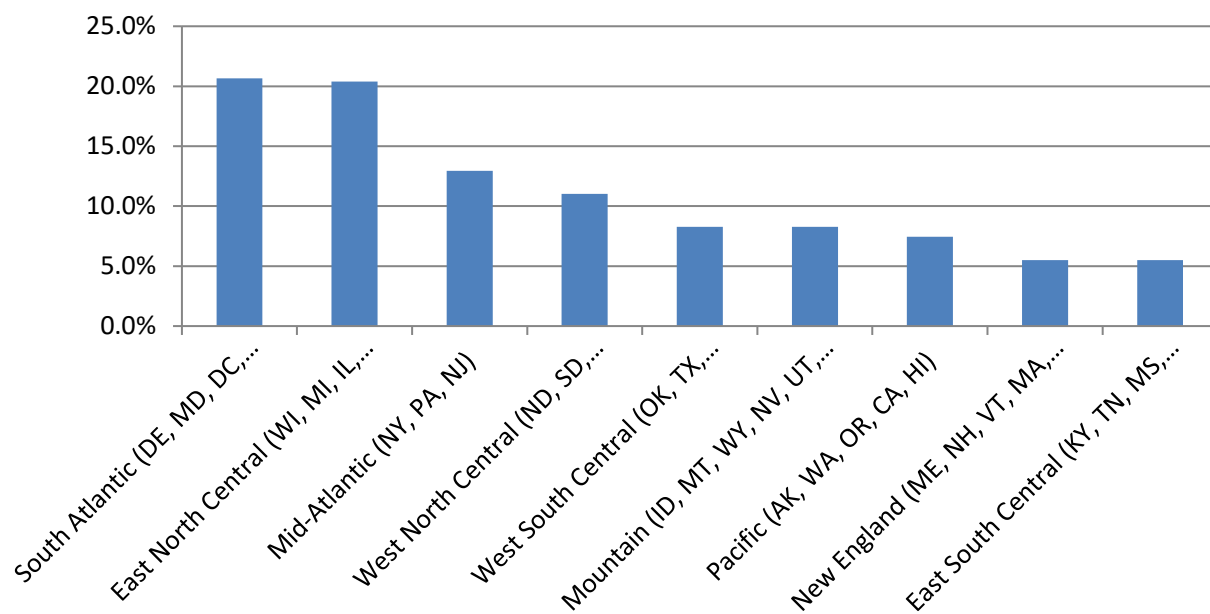
2018 Enrollment Analysis

Mean number of students entering by program and institution type.

	Radiography			Radiation Therapy			Nuclear Medicine Technology			Total		
	Mean	N	*SD*	Mean	N	*SD*	Mean	N	*SD*	Mean	N	*SD*
For-profit school	30.8	19.0	21.5	.0	1.0	.	.	.	.	29.3	20	22.1
Community college or two-year institution	23.3	127.0	10.3	11.5	6.0	5.1	19.7	3.0	13.9	22.7	136	10.4
University or four-year institution	26.7	68.0	19.6	14.7	26.0	9.9	11.4	14.0	10.0	21.8	108	17.8
Technical College	22.0	31.0	18.9	9.5	2.0	.7	17.0	2.0	9.9	21.0	35	18.1
Medical center	12.5	52.0	7.4	6.7	6.0	2.4	5.6	8.0	3.7	11.1	66	7.2
Total	**22.5**	**297.0**	**15.2**	**12.4**	**41.0**	**8.9**	**11.0**	**27.0**	**9.6**	**20.5**	**365**	**14.9**

An analysis of variance showed an overall difference in the mean number of students entering by institution type, $F(4, 365) = 9.917$, $P < .001$. Post hoc comparisons using the Bonferroni correction indicated that the mean number of students entering medical centers was statistically different than the other institution types, $P < .001$, (.05/5).

Mean number of students entering by institution type. (Overall)
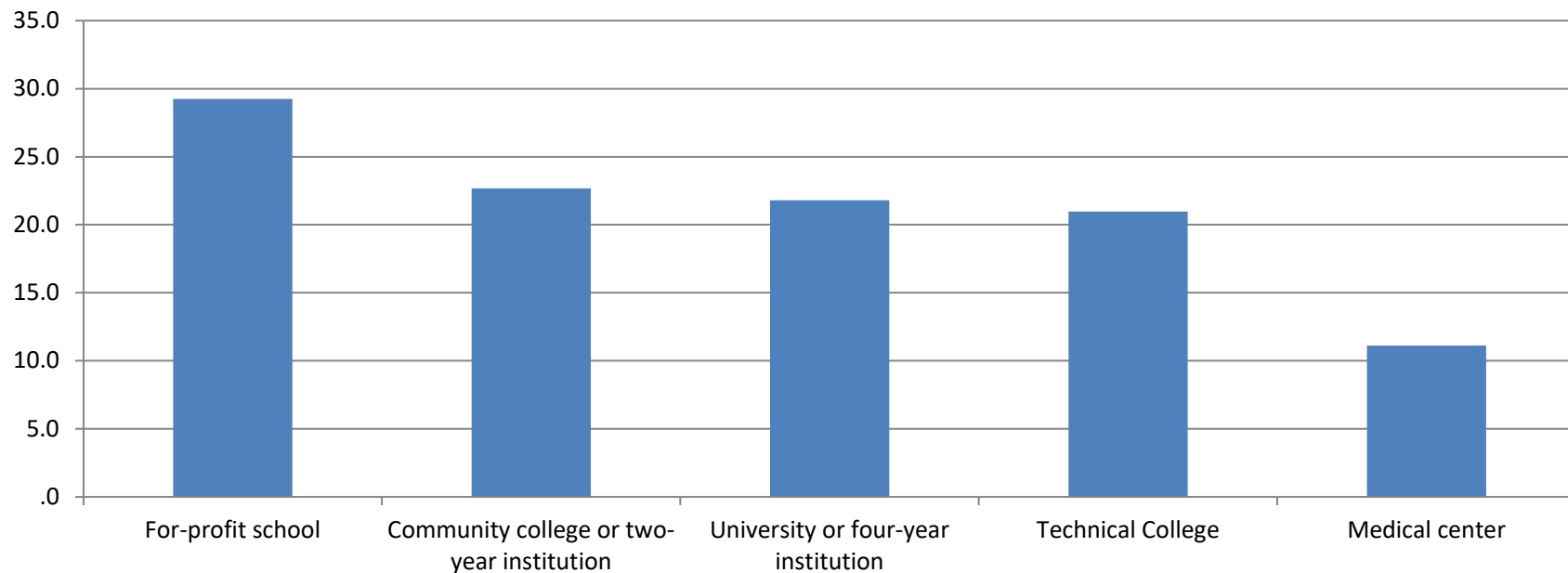
Is your program currently at full enrollment?

		Radiography	Radiation Therapy	Nuclear Medicine Technology	Total
Yes	N	169	23	11	203
	%	56.7%	56.1%	40.7%	55.5%
No	N	129	18	16	163
	%	43.3%	43.9%	59.3%	44.5%
Total	N	298	41	27	366
	%	100.0%	100.0%	100.0%	100.0%

There was no overall statistically significant difference between the group percentages.

Is your program currently at full enrollment?

　　　　　　　　　2018 Enrollment Snapshot

	Radiography			Radiation Therapy			Nuclear Medicine Technology			Total		
	Mean	N	*SD*	Mean	N	*SD*	Mean	N	*SD*	Mean	N	*SD*
If you are not at full enrollment, how many additional students could be accommodated by your program?	7.1	127	8.9	7.7	18	9.7	11.0	16	14.3	7.5	161	9.6
How many qualified students did you turn away this fall?	26.6	289	58.3	29.0	38	52.9	8.8	27	30.6	25.5	354	56.2
Attrition rate in 2017	15.0%	292	13.7%	9.4%	39	11.2%	8.1%	27	11.8%	13.8%	358	13.5%

If you are not at full enrollment, how many additional students could be accommodated by your program?
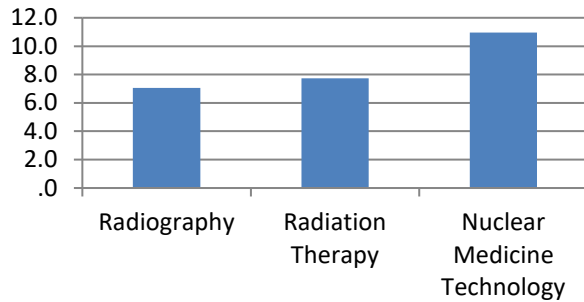
How many qualified students did you turn away this fall?
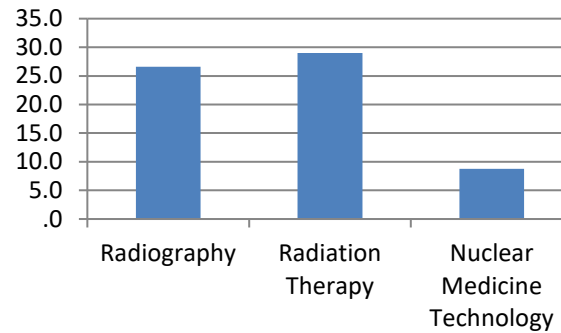
What was the attrition rate for the class of 2017?
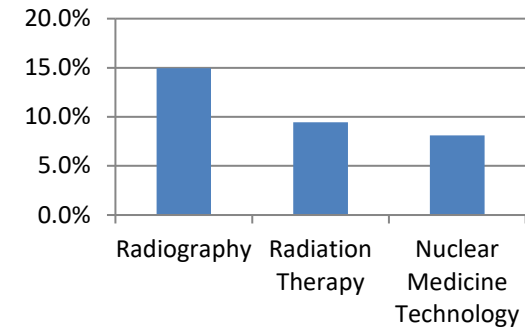
Do you plan any changes related to enrollment?

		Radiography	Radiation Therapy	Nuclear Medicine Technology	Total
Plan to increase	N	47	6	8	61
	%	15.8%	14.6%	29.6%	16.7%
Plan to decrease	N	5	2	1	8
	%	1.7%	4.9%	3.7%	2.2%
Plan to remain the same	N	245	33	18	296
	%	82.5%	80.5%	66.7%	81.1%
Total	N	297	41	27	365
	%	100.0%	100.0%	100.0%	100.0%

There was no overall statistically significant difference between the group percentages.

Do you plan any changes related to enrollment?

■ Plan to increase   ■ Plan to decrease   ■ Plan to remain the same

2018 Enrollment Snapshot
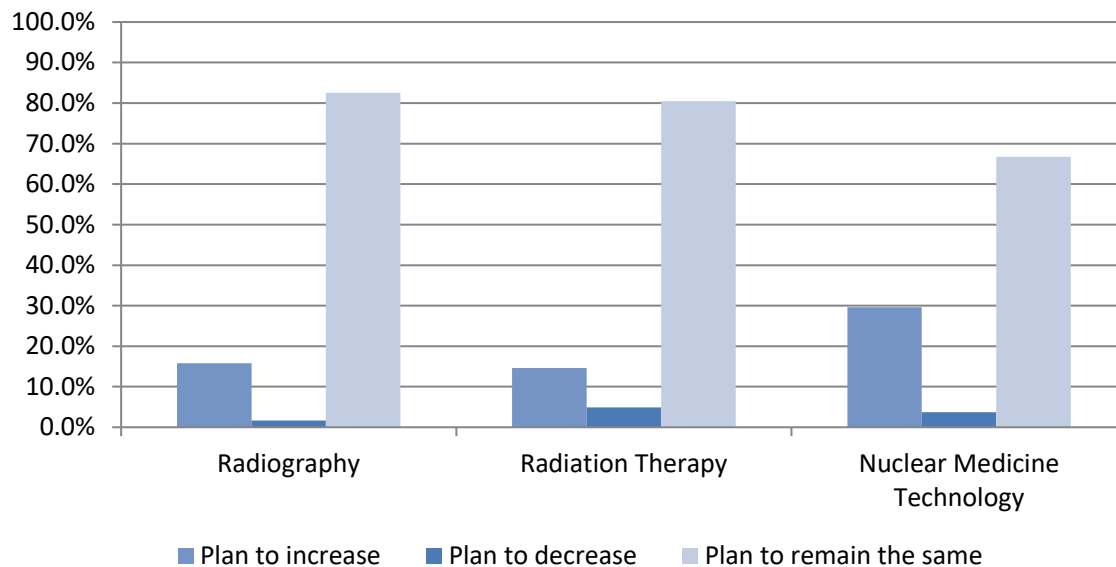
How viable is your program over the next few years?

		Radiography	Radiation Therapy	Nuclear Medicine Technology	Total
Will definitely continue to operate	N	258	29	19	306
	%	87.2%	70.7%	70.4%	84.1%
Most likely will continue to operate	N	36	10	8	54
	%	12.2%	24.4%	29.6%	14.8%
Most likely will be closing	N	0	0	0	0
	%	0.0%	0.0%	0.0%	0.0%
Definitely will be closing	N	2	2	0	4
	%	0.7%	4.9%	0.0%	1.1%
Total	N	296	41	27	364
	%	100.0%	100.0%	100.0%	100.0%

The percentage differences were statistically significant χ^2 (4, n = 364) = 13.0 p = .003.

How viable is your program over the next few years?

■ Will definitely continue to operate   ■ Most likely will continue to operate
■ Most likely will be closing   ■ Definitely will be closing
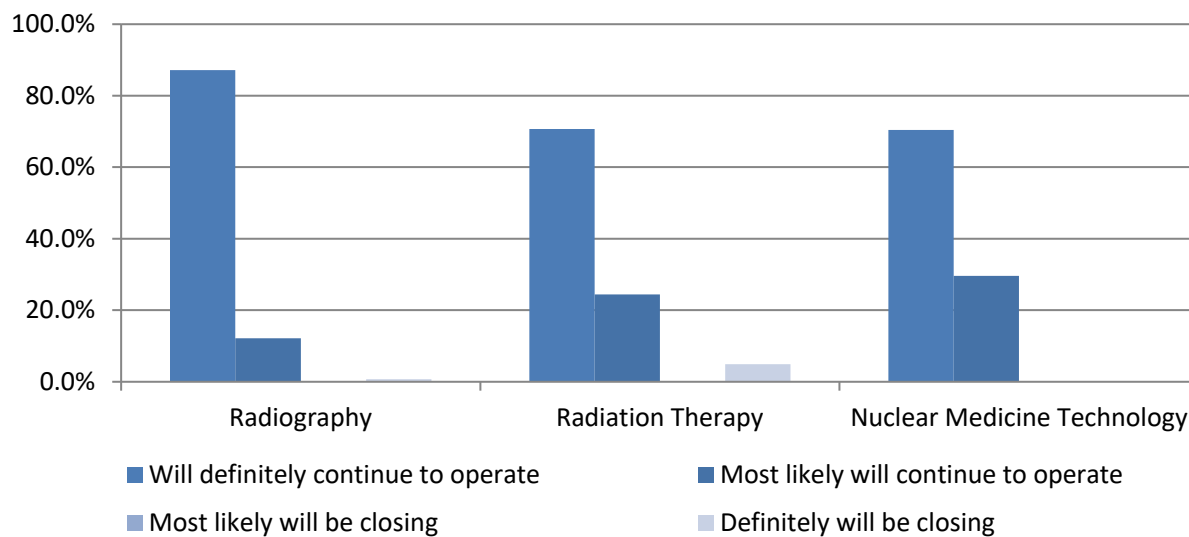
Longitudinal Enrollment Trends

Radiography

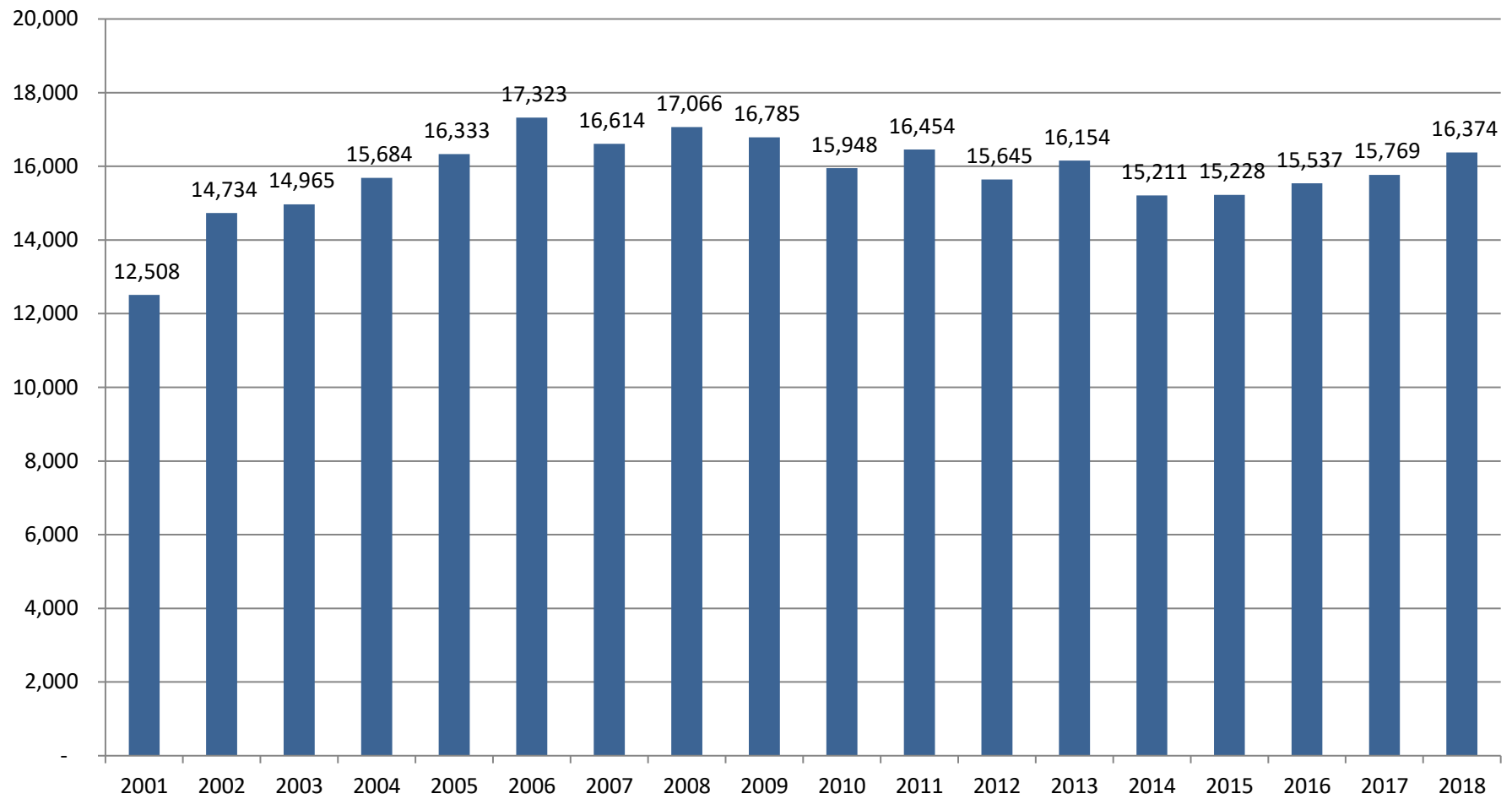| Year	ARRT recognized programs	Percent of programs responding to survey with enrollment data	Mean number of students entering classroom	Estimated total students enrolled for all programs	Mean attrition Rate	Percent of programs not at full capacity	Mean additional students per program for those not at full capacity	Estimated total additional students for programs not at full capacity	Mean qualified students per program turned away	Estimated total qualified students turned away
2001	590	75.4%	21.2	12,508	21.6%	50.2%	.	.	.	.
2002	631	67.5%	23.4	14,734	23.6%	30.9%	8.7	1,696	31.6	13,778
2003	639	71.4%	23.4	14,965	21.6%	21.2%	5.8	786	46.8	23,565
2004	684	68.7%	22.9	15,684	20.5%	21.7%	7.5	1,113	55.1	29,510
2005	715	66.4%	22.8	16,333	18.1%	20.9%	7.4	1,106	50.9	28,787
2006	723	74.7%	24.0	17,323	18.4%	22.6%	7.0	1,144	59.2	33,128
2007	729	69.3%	22.8	16,614	17.8%	30.2%	7.1	1,563	56.8	28,902
2008	742	71.0%	23.0	17,066	21.1%	33.3%	8.4	2,076	50.4	24,944
2009	746	61.0%	22.5	16,785	20.8%	40.0%	3.7	1,104	43.4	19,426
2010	751	65.5%	21.2	15,948	23.3%	43.7%	7.6	2,490	39.1	16,528
2011	751	57.8%	21.9	16,454	25.8%	46.2%	7.6	2,637	37.1	14,978
2012	750	62.8%	20.9	15,645	29.1%	44.9%	8.3	2,785	39.5	16,336
2013	741	50.5%	21.8	16,154	27.9%	46.5%	7.8	2,688	36.3	14,391
2014	739	49.1%	20.6	15,211	31.2%	50.3%	7.2	2,682	34.1	12,522
2015	736	54.2%	20.7	15,228	36.7%	49.9%	8.7	3,195	27.7	10,214
2016	736	39.5%	21.1	15,537	18.2%	47.6%	6.6	2,326	23.6	9,102
2017	727	35.6%	21.7	15,769	18.5%	47.5%	8.3	2,849	30.8	11,756
2018	730	40.8%	22.4	16,374	15.0%	43.3%	7.1	2,235	26.6	11,002

Estimated total number of students enrolled in all Radiography programs:

Bar chart showing estimated total number of students enrolled in all Radiography programs by year:

Year	Students
2001	12,508
2002	14,734
2003	14,965
2004	15,684
2005	16,333
2006	17,323
2007	16,614
2008	17,066
2009	16,785
2010	15,948
2011	16,454
2012	15,645
2013	16,154
2014	15,211
2015	15,228
2016	15,537
2017	15,769
2018	16,374

Radiation Therapy

Year	ARRT recognized programs	Percent of programs responding to survey with enrollment data	Mean number of students entering classroom	Estimated total students enrolled for all programs	Mean attrition Rate	Percent of programs not at full capacity	Mean additional students per program for those not at full capacity	Estimated total additional students for programs not at full capacity	Mean qualified students per program turned away	Estimated total qualified students turned away
2001	86	60.5%	10.0	860	18.1%	44.4%	.		.	
2002	95	58.9%	14.0	1,326	11.1%	48.0%	5.7	260	9.1	450
2003	101	57.4%	12.6	1,274	18.0%	44.6%	4.4	198	13.6	761
2004	105	55.2%	14.4	1,513	11.9%	30.5%	12.5	400	13.4	978
2005	113	63.7%	12.5	1,416	16.8%	32.1%	3.4	123	24.5	1880
2006	118	68.6%	11.0	1,295	16.6%	49.3%	6.4	372	21.6	1292
2007	122	57.4%	12.9	1,576	15.2%	51.5%	6.3	396	13.3	787
2008	125	49.6%	10.5	1,313	14.4%	58.6%	4.5	330	33.0	1708
2009	122	50.8%	12.5	1,525	10.9%	55.5%	3.7	251	15.8	858
2010	122	58.2%	12.0	1,462	18.3%	49.3%	7.9	475	18.0	1112
2011	123	42.3%	9.8	1,204	21.9%	51.9%	6.1	388	14.3	846
2012	122	48.4%	11.5	1,403	18.9%	53.4%	6.9	451	14.4	818
2013	121	55.4%	12.5	1,513	21.8%	57.6%	5.7	397	17.1	877
2014	117	45.3%	13.2	1,544	26.5%	49.1%	6.2	355	15.7	935
2015	113	49.6%	13.9	1,572	24.6%	55.4%	7.1	444	14.8	746
2016	110	35.5%	10.8	1,185	7.3%	60.5%	4.6	309	11.3	492
2017	110	33.6%	10.5	1,151	10.0%	43.2%	5.2	247	16.0	998
2018	109	37.6%	12.4	1,356	9.4%	43.9%	7.7	369	29.0	1773

Estimated total number of students enrolled in all Radiation Therapy programs:

Bar chart showing estimated total number of students enrolled in all Radiation Therapy programs by year:

Year	Students
2001	860
2002	1,326
2003	1,274
2004	1,513
2005	1,416
2006	1,295
2007	1,576
2008	1,313
2009	1,525
2010	1,462
2011	1,204
2012	1,403
2013	1,513
2014	1,544
2015	1,572
2016	1,185
2017	1,151
2018	1,356
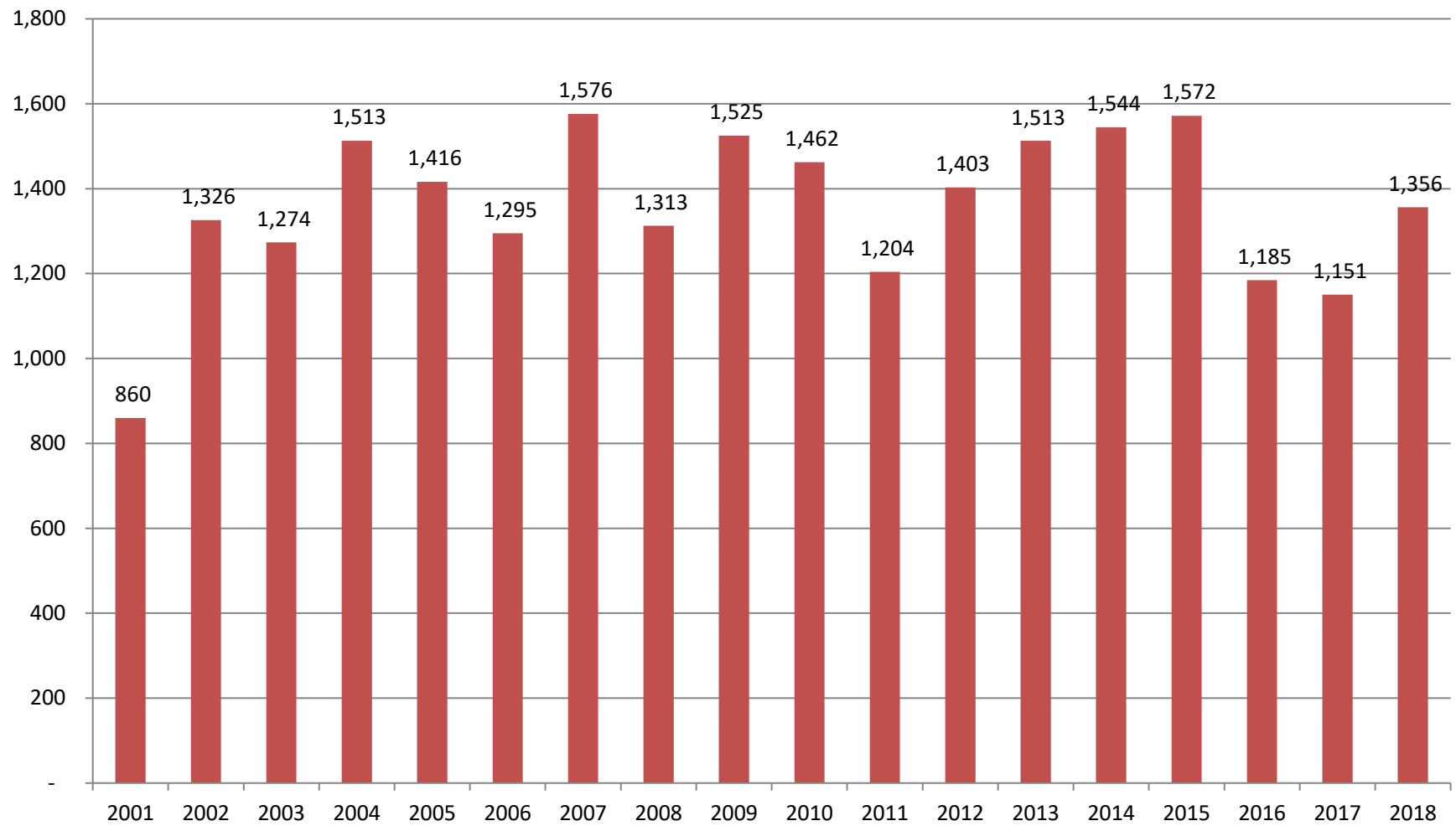
Nuclear Medicine

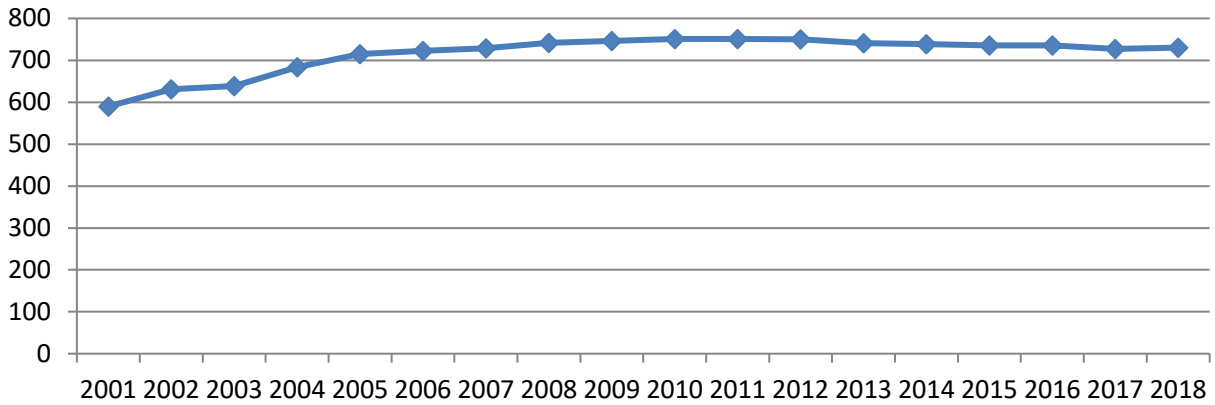| Year	ARRT recognized programs	Percent of programs responding to survey with enrollment data	Mean number of students entering classroom	Estimated total students enrolled for all programs	Mean attrition Rate	Percent of programs not at full capacity	Mean additional students per program for those not at full capacity	Estimated total additional students for programs not at full capacity	Mean qualified students per program turned away	Estimated total qualified students turned away
2001	101	62.4%	12.4	1,252	11.8%	53.2%	.		.	
2002	104	55.8%	14.0	1,454	8.0%	35.7%	6.7	248.8	19.7	1317
2003	111	59.5%	14.5	1,612	7.1%	33.3%	2.7	99.8	32.1	2377
2004	117	58.1%	14.0	1,633	9.8%	20.9%	3.6	88.0	24.4	2258
2005	122	57.4%	13.7	1,673	8.6%	30.6%	5.1	190.4	32.9	2786
2006	131	71.8%	15.5	2,033	10.2%	31.8%	5.7	237.5	30.2	2698
2007	132	56.8%	13.5	1,781	8.3%	39.7%	6.3	330.1	24.2	1926
2008	136	59.6%	12.2	1,659	12.3%	58.4%	10.0	794.2	18.2	1030
2009	136	48.5%	10.8	1,469	7.0%	63.0%	4.3	368.4	9.3	468
2010	136	48.5%	11.3	1,534	12.9%	78.8%	7.0	747.9	12.9	372
2011	134	47.0%	8.8	1,175	11.3%	82.5%	7.2	796.0	8.0	187
2012	134	56.7%	10.5	1,407	18.4%	73.0%	8.7	851.0	6.4	231
2013	128	46.9%	10.0	1,280	23.8%	76.1%	7.9	769.5	7.8	239
2014	125	42.4%	8.5	1,061	36.7%	79.2%	8.1	802.4	8.3	216
2015	122	50.8%	10.5	1,276	17.3%	68.9%	6.0	504.3	4.5	171
2016	120	33.3%	11.4	1,368	11.1%	67.5%	7.8	631.8	3.2	124
2017	117	27.4%	10.9	1,273	9.3%	71.9%	6.7	559.4	2.5	82
2018	117	23.1%	11.0	1,287	8.1%	59.3%	11.0	761.1	8.8	418

Estimated total number of students enrolled in all Nuclear Medicine programs:

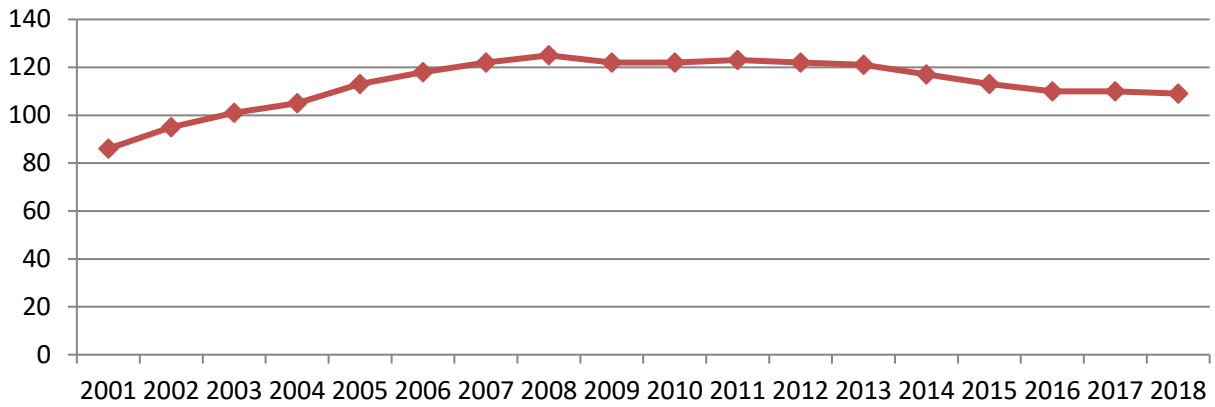| Year	Students
2001	1,252
2002	1,454
2003	1,612
2004	1,633
2005	1,673
2006	2,033
2007	1,781
2008	1,659
2009	1,469
2010	1,534
2011	1,175
2012	1,407
2013	1,280
2014	1,061
2015	1,276
2016	1,368
2017	1,273
2018	1,287
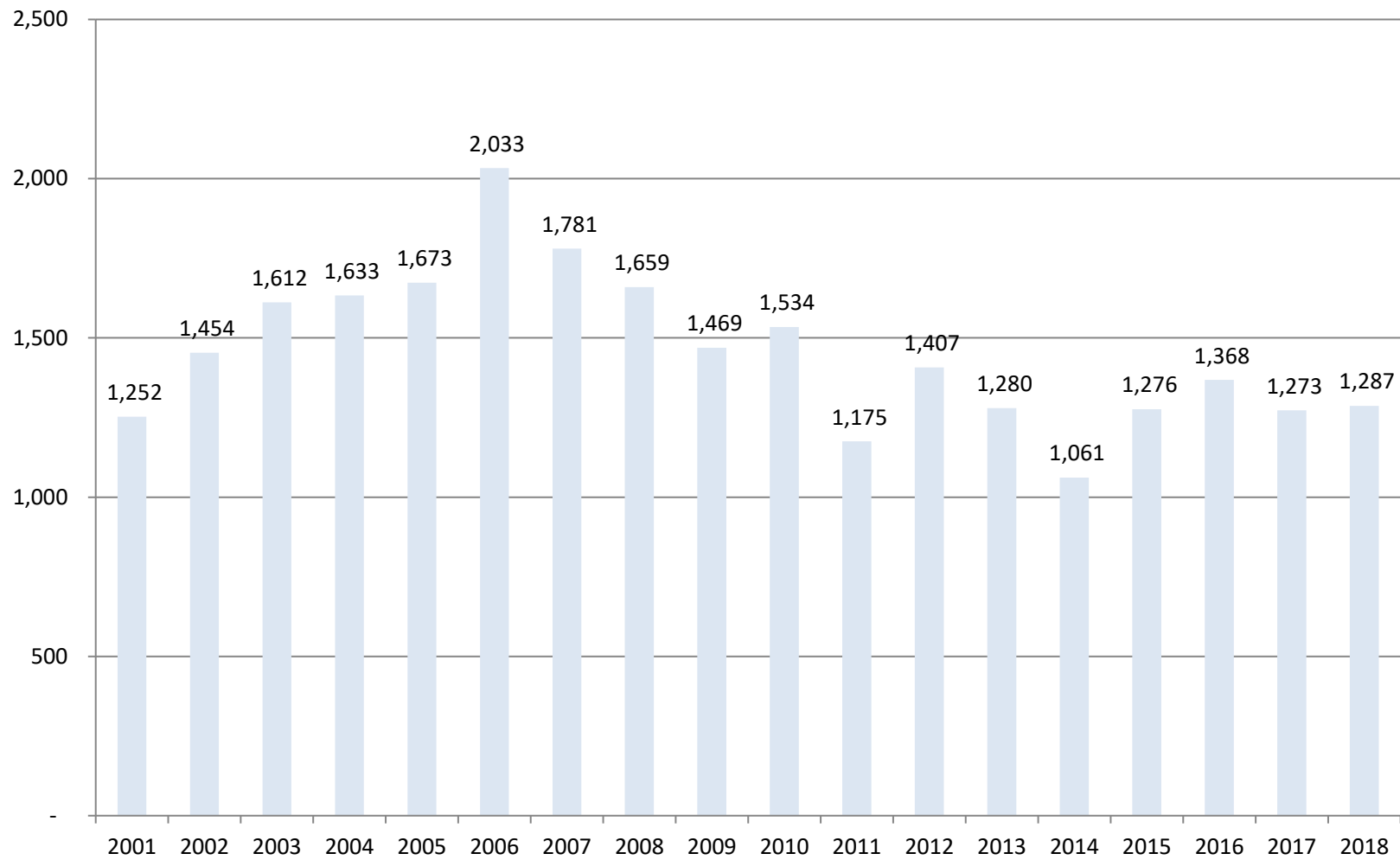
Number of ARRT-recognized programs by discipline:
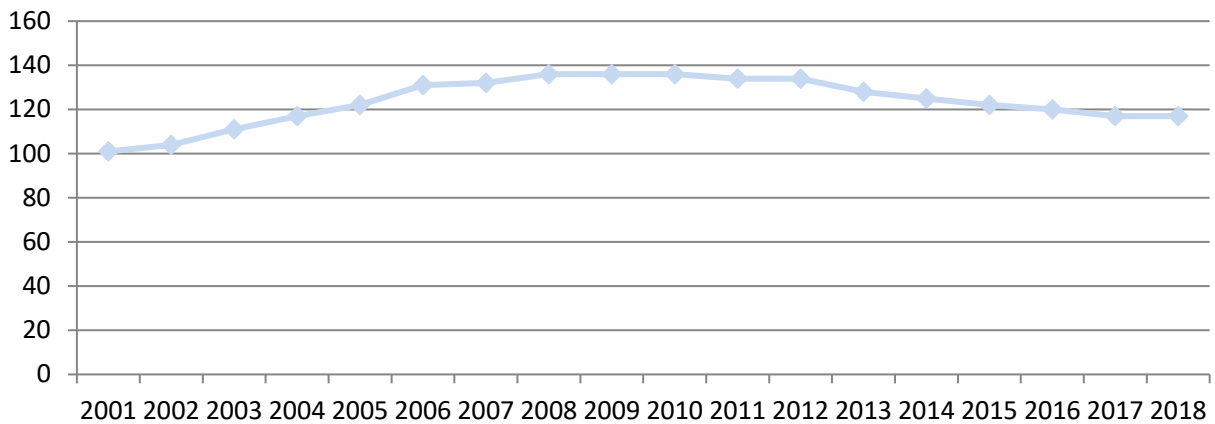
Radiography

Radiation Therapy

Nuclear Medicine Technology

2018 Comparison of U.S. and Canadian Programs

Radiography

Country	ARRT recognized programs	Percent of programs responding to survey with enrollment data	Mean number of students entering classroom	Estimated total students enrolled for all programs	Mean attrition Rate	Percent of programs not at full capacity	Mean additional students per program for those not at full capacity	Estimated total additional students for programs not at full capacity	Mean qualified students per program turned away	Estimated total qualified students turned away
USA	700	41.4%	22.1	15,484	15.1%	43.8%	7.0	2,160	23.4	9,194
Canada	21	28.6%	29.8	626	9.0%	16.7%	10.0	35	173.8	3,039

Radiation Therapy

Country	ARRT recognized programs	Percent of programs responding to survey with enrollment data	Mean number of students entering classroom	Estimated total students enrolled for all programs	Mean attrition Rate	Percent of programs not at full capacity	Mean additional students per program for those not at full capacity	Estimated total additional students for programs not at full capacity	Mean qualified students per program turned away	Estimated total qualified students turned away
USA	89	41.6%	11.9	1,061	10.4%	40.5%	7.3	264	21.3	1126
Canada	15	20.0%	9.7	145	0.0%	100.0%	9.7	145	59.7	0

Nuclear Medicine Technology

Country	ARRT recognized programs	Percent of programs responding to survey with enrollment data	Mean number of students entering classroom	Estimated total students enrolled for all programs	Mean attrition Rate	Percent of programs not at full capacity	Mean additional students per program for those not at full capacity	Estimated total additional students for programs not at full capacity	Mean qualified students per program turned away	Estimated total qualified students turned away
USA	112	23.2%	10.5	1,176	7.8%	61.5%	11.0	755.5	3.0	128
Canada	5	20.0%	24.0	120	15.0%	0.0%	0.0	-	160.0	-