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Multiple Malignancy Cancer Study

Fall 2015 Internship

Allison Mahon

Dr. Zorsky

Dr. Holdai

INTRODUCTION

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- Richard A. Henson Cancer Institute of Penninsula Regional Medical Center is known as one of the best cancer research centers on the Eastern Shore

- Multiple Malignancy Study
  - Looked through data from 2004-present to conclude any links between multiple cancers, any significant differences in dates of diagnosis, time between diagnosis, and probabilities of developing additional cancers after first diagnosis.

RESPONSIBILITIES/TASKS

- Weekly meetings with Dr. Zorsky to discuss progress and brainstorm ideas
- Ongoing online repository to share notes and discussions between meetings

- Sort through many data files to see what data was included and how it was organized
- Create calculated fields within the data set
- Make use of functions within excel in addition to using statistical software Minitab and SPSS

DATA SETS

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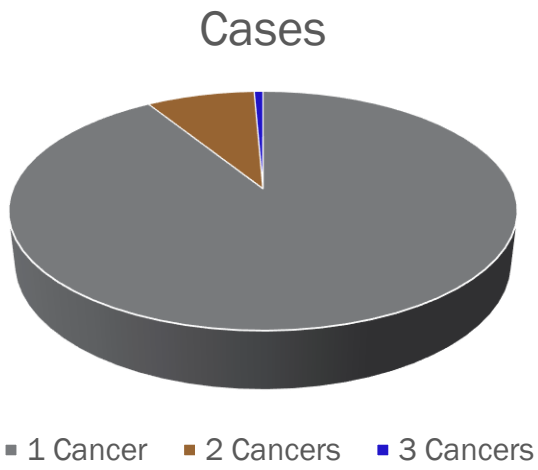
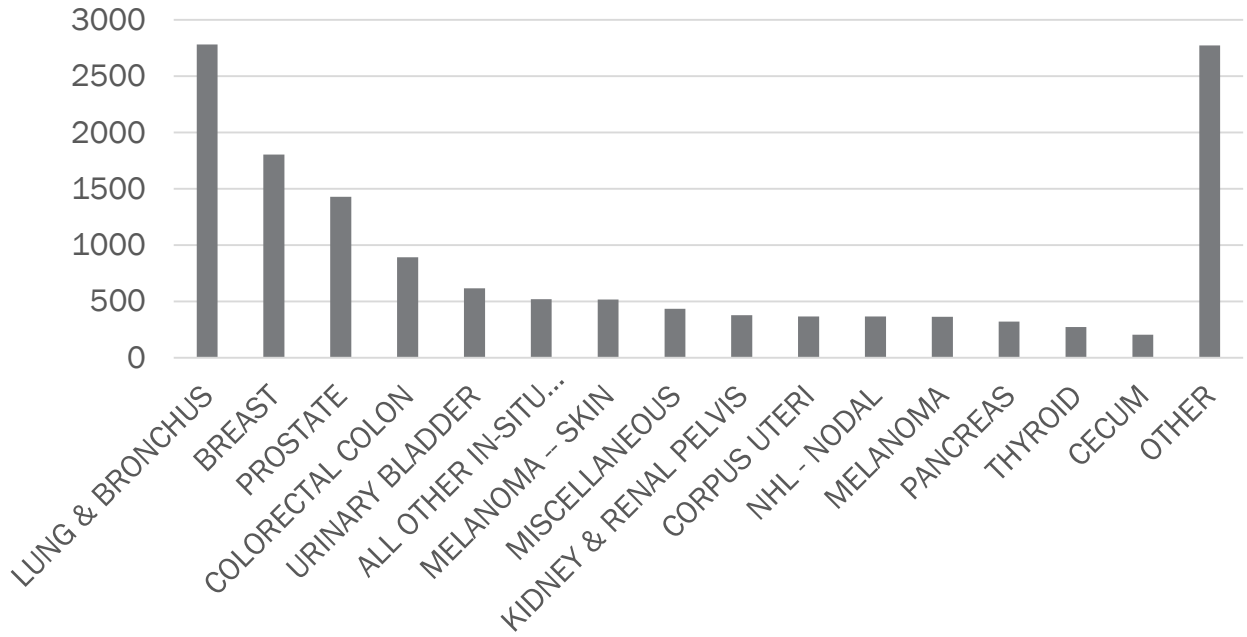
- Main data sets looked at were cases of one cancer, two cancers, and three cancers as that covered the main part of the data from the registry. Minimal cases had four or more cancers.

- Out of 15390 cancer cases analyzed,
  - 14022 one cancer cases
  - 1265 two cancer cases
  - 103 three cancer cases



ONE CANCER

LUNG & BRONCHUS	2782
BREAST	1803
PROSTATE	1427
COLORECTAL - COLON	890
URINARY BLADDER	616
ALL OTHER IN-SITU CARCINOMAS	518
MELANOMA - SKIN	517



TWO CANCERS

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Variable	Total Count	Mean	StDev	Minimum	Median	Maximum
AgeAtDX1	1265	65.982	11.443	18	67	92
AgeAtDX2	1265	69.509	11.292	21	71	94
AgeAtLastContact	1265	72.788	11.169	24	74	100
MonthsBetween	1265	42.957	41.471	0.033	30.1	176.067

VSTATUS	
0	603
1	662

SEX	
1	688
2	577

TWO CANCERS

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BREAST	**14.47%**
BREAST	5.93%
LUNG & BRONCHUS	1.90%
ALL OTHER IN-SITU CARCINOMAS	1.03%
LUNG & BRONCHUS	**12.25%**
LUNG & BRONCHUS	4.98%
LARYNX	0.71%
URINARY BLADDER	0.71%
PROSTATE	**11.23%**
LUNG & BRONCHUS	2.29%
URINARY BLADDER	1.50%
URINARY BLADDER	**7.27%**
LUNG & BRONCHUS	2.21%
URINARY BLADDER	1.03%

BREAST , BREAST	75
LUNG & BRONCHUS , LUNG & BRONCHUS	63
PROSTATE , LUNG & BRONCHUS	29
URINARY BLADDER , LUNG & BRONCHUS	28
BREAST , LUNG & BRONCHUS	24
MELANOMA -- SKIN , MELANOMA -- SKIN	22
ALL OTHER IN-SITU CARCINOMAS , BREAST	21

Total Different	%Different
432	**34.15%**

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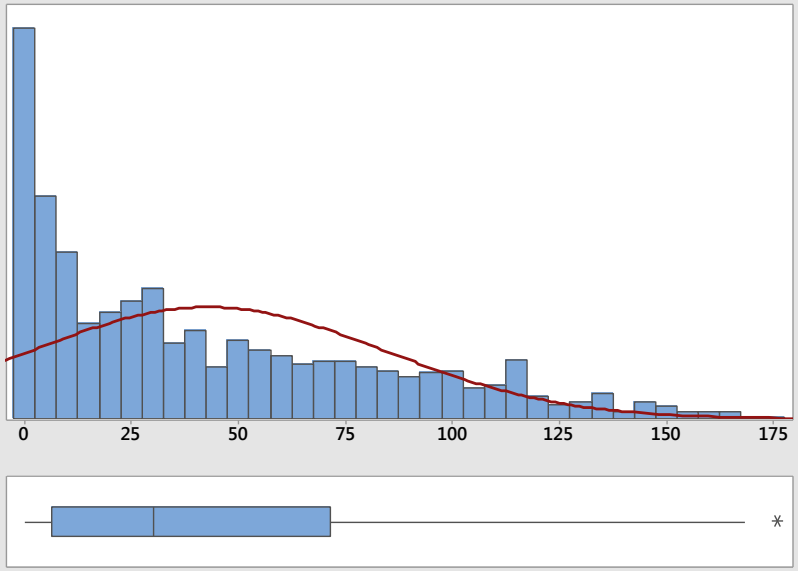
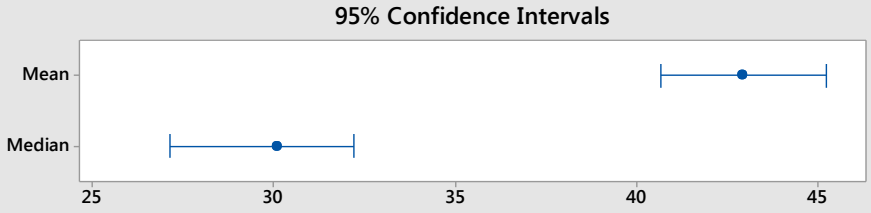
Summary Report for Months_BetweenCancers



Anderson-Darling Normality Test	
A-Squared	47.36
P-Value	<0.005
Mean	42.957
StDev	41.471
Variance	1719.837
Skewness	0.917831
Kurtosis	-0.098794
N	1265
Minimum	0.033
1st Quartile	6.567
Median	30.100
3rd Quartile	71.450
Maximum	176.067
95% Confidence Interval for Mean	
40.669	45.244
95% Confidence Interval for Median	
27.120	32.195
95% Confidence Interval for StDev	
39.916	43.153



SURVIVAL CURVES

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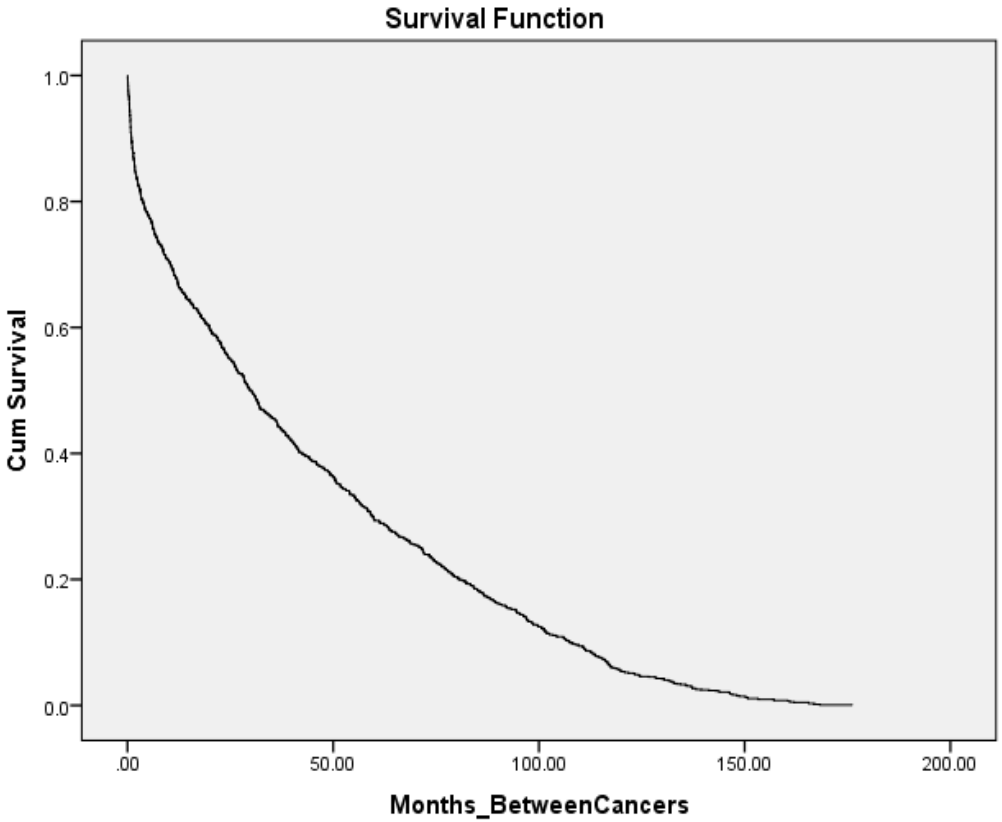

Descriptive Statistics: Months_BetweenCancers

Variable	Total Count	Mean	Minimum	Median	Maximum
Months_BetweenCancers	1265	42.96	0.03	30.10	176.07

THREE CANCERS

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Variable	Total Count	Mean	StDev	Minimum	Median	Maximum
AgeDX1	103	67.23	10.416	19	69	87
AgeDX2	103	70.28	10.615	20	71	92
AgeDX3	103	72.26	10.789	20	73	92
AGE_LASTCONTACT	103	74.57	10.225	33	74	95
MonthsDX1-DX2	103	37.26	32.821	0.1	27.27	164.3
MonthsDX2-DX3	103	23.83	32.338	0	9.6	164.3

VSTATUS		SEX	
0	55	1	55
1	48	2	48

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LUNG & BRONCHUS , LUNG & BRONCHUS , LUNG & BRONCHUS	6
MELANOMA -- SKIN , MELANOMA -- SKIN , MELANOMA -- SKIN	6
BREAST , BREAST , ALL OTHER IN-SITU CARCINOMAS	2
BREAST , BREAST , BREAST	2
BREAST , BREAST , LUNG & BRONCHUS	2
MELANOMA , MELANOMA , MELANOMA	2
URINARY BLADDER , LUNG & BRONCHUS , LUNG & BRONCHUS	2

Total Different	%Different
88	85.44%

THREE CANCERS

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LUNG & BRONCHUS	**12.62%**
LUNG & BRONCHUS	**53.85%**
TONGUE	**7.69%**
NHL - NODAL	100.00%
BREAST	**7.69%**
LIVER	100.00%
HYPOPHARYNX	**7.69%**
BREAST	100.00%
URINARY BLADDER	**7.69%**
LUNG & BRONCHUS	100.00%
KIDNEY & RENAL PELVIS	**7.69%**
LUNG & BRONCHUS	100.00%
LARYNX	**7.69%**
NHL - NODAL	100.00%
BREAST	**12.62%**
BREAST	**53.85%**
ALL OTHER IN-SITU CARCINOMAS	28.57%
LUNG & BRONCHUS	28.57%
BREAST	28.57%
CORPUS UTERI	14.29%
SIGMOID COLON	**15.38%**
MISCELLANEOUS	50.00%
BREAST	50.00%

MELANOMA -- SKIN	**11.65%**
MELANOMA -- SKIN	**66.67%**
MELANOMA -- SKIN	75.00%
THYROID	12.50%
MELANOMA	12.50%
MELANOMA	**16.67%**
MELANOMA -- SKIN	50.00%
MELANOMA	50.00%
PROSTATE	**11.65%**
LUNG & BRONCHUS	**16.67%**
URINARY BLADDER	50.00%
LUNG & BRONCHUS	50.00%
BENIGN/BORDERLINE PRIMARY INTRACRANIAL AND CNS	**16.67%**
MISCELLANEOUS	50.00%
LUNG & BRONCHUS	50.00%
MELANOMA	**16.67%**
MELANOMA -- SKIN	50.00%
MELANOMA	50.00%

THREE CANCERS

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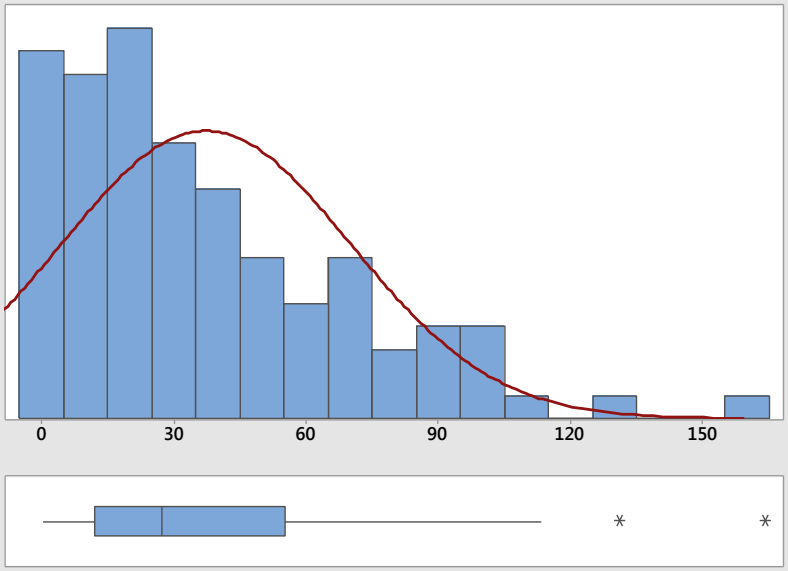
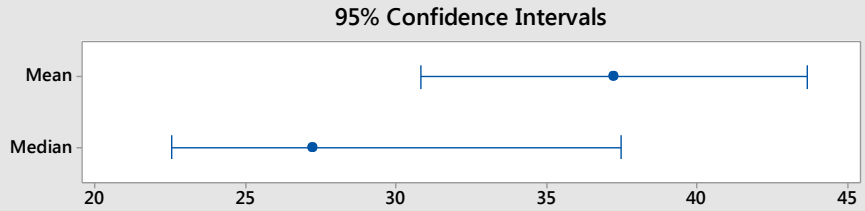
Summary Report for Months_Cancer1ToCancer2



Anderson-Darling Normality Test	
A-Squared	2.96
P-Value	<0.005
Mean	37.259
StDev	32.821
Variance	1077.191
Skewness	1.21074
Kurtosis	1.51677
N	103
Minimum	0.100
1st Quartile	11.900
Median	27.267
3rd Quartile	55.067
Maximum	164.300
95% Confidence Interval for Mean	
30.844	43.673
95% Confidence Interval for Median	
22.573	37.453
95% Confidence Interval for StDev	
28.869	38.036



THREE CANCERS

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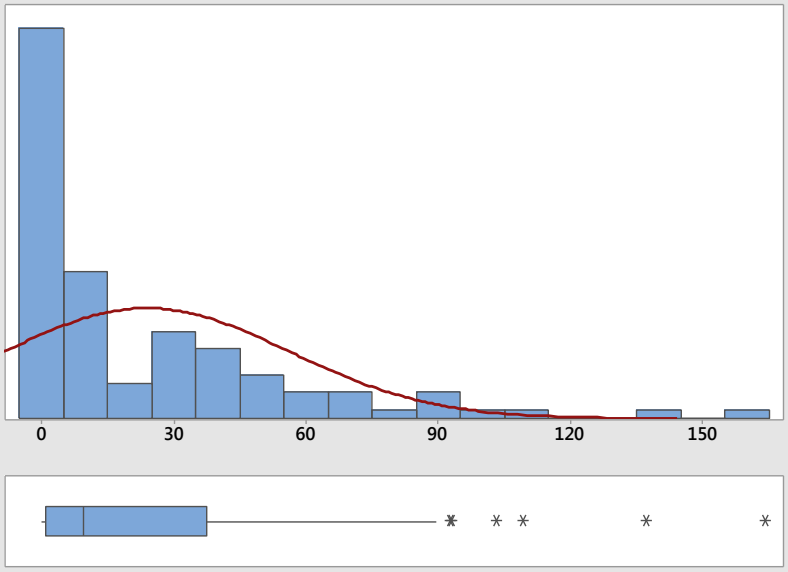
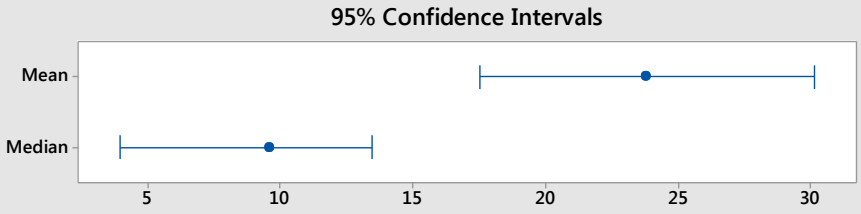
Summary Report for Months_Cancer2ToCancer3



Anderson-Darling Normality Test	
A-Squared	8.20
P-Value	<0.005
Mean	23.833
StDev	32.338
Variance	1045.760
Skewness	1.92240
Kurtosis	4.11934
N	103
Minimum	0.000
1st Quartile	0.933
Median	9.600
3rd Quartile	37.567
Maximum	164.300
95% Confidence Interval for Mean	
17.513	30.153
95% Confidence Interval for Median	
3.950	13.474
95% Confidence Interval for StDev	
28.444	37.477



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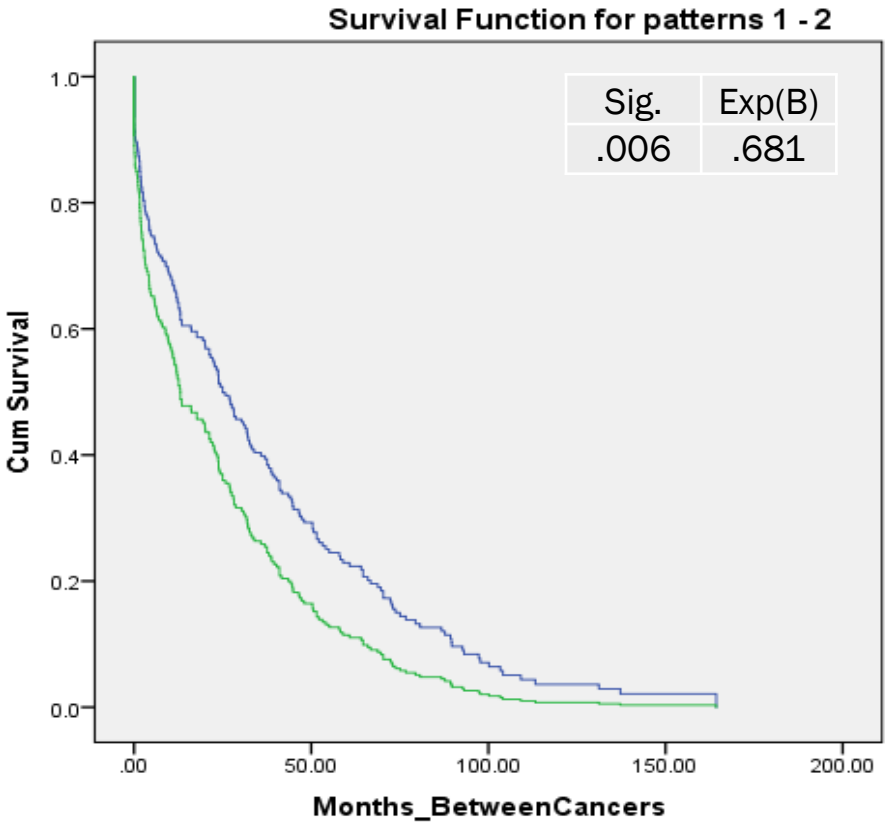

NumberOfCancers
2
3

(3 Cancers)Descriptive Statistics: Months_Cancer1ToCancer2

Variable	Total Count	Mean	StDev	Minimum	Median	Maximum
Months_Cancer1ToCancer2	103	37.26	32.82	0.10	27.27	164.30

(3 Cancers)Descriptive Statistics: Months_Cancer2ToCancer3

Variable	Total Count	Mean	StDev	Minimum	Median	Maximum
Months_Cancer2ToCancer3	103	23.83	32.34	0.00	9.60	164.30

Estimation for Paired Difference

Mean	StDev	SE Mean	95% CI for μ_d
13.426	49.061	4.834	(3.837, 23.014)

μ_d: mean of (Months_Cancer1ToCancer2 - Months_Cancer2ToCancer3)

LUNG CANCER

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Variable	Total Count	Mean	Median
1CancerAgeDX	2782	69.38	70
2CancersAgeDX	155	67.59	68
3CancersDX	13	69.77	68
1CancerAgeLastContact	2782	71.09	72
2CancerAgeLastContact	155	73.14	73
3CancerAgeLastContact	13	76.77	73
1st Cancer AgeDX1	2950	69.29	70
2nd Cancers AgeDX2	74	71.10	71
3rd Cancer AgeDX3	25	75.88	73

CHALLENGES FACED

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- Retrieving the data from the cancer registry in a timely manor
- Checking the data to make sure it is accurate
- Organizing the data into a form that is manageable and easy to work with in Excel and MiniTab

LESSONS LEARNED

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- How to apply classroom knowledge to a real life situation
- Make use of functionality of software discussed in classes
- Being able to look at the data and think about how to present it