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Efficacy of U.S. NAVY Treatment Tables in 103 Recreational SCUBA Divers

June 2014

Problem Statement

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- Several divers presenting to the UCLA Health System for therapy
  - Many never achieve resolution
  - We are not meeting success rates reported in the literature

Question# 1

- Human trials conducted during the synthesis of TT5/TT6 used minimal civilian cases.
  - Are we treating these patients with an inadequate drug?

- How therapeutic were U.S. Navy Treatment Tables 5 and 6 for DCS in SCUBA divers we treated?

Question #2

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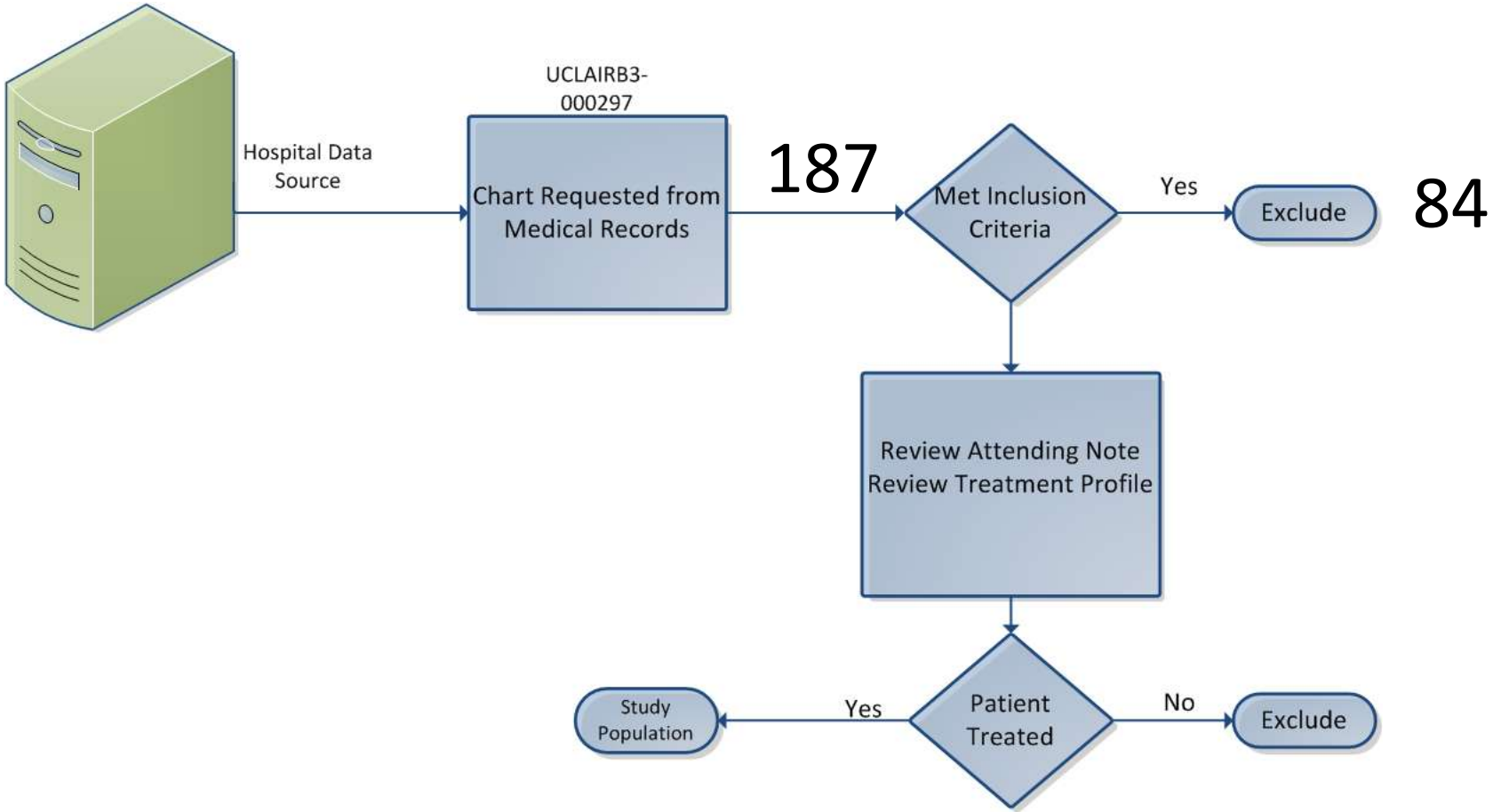
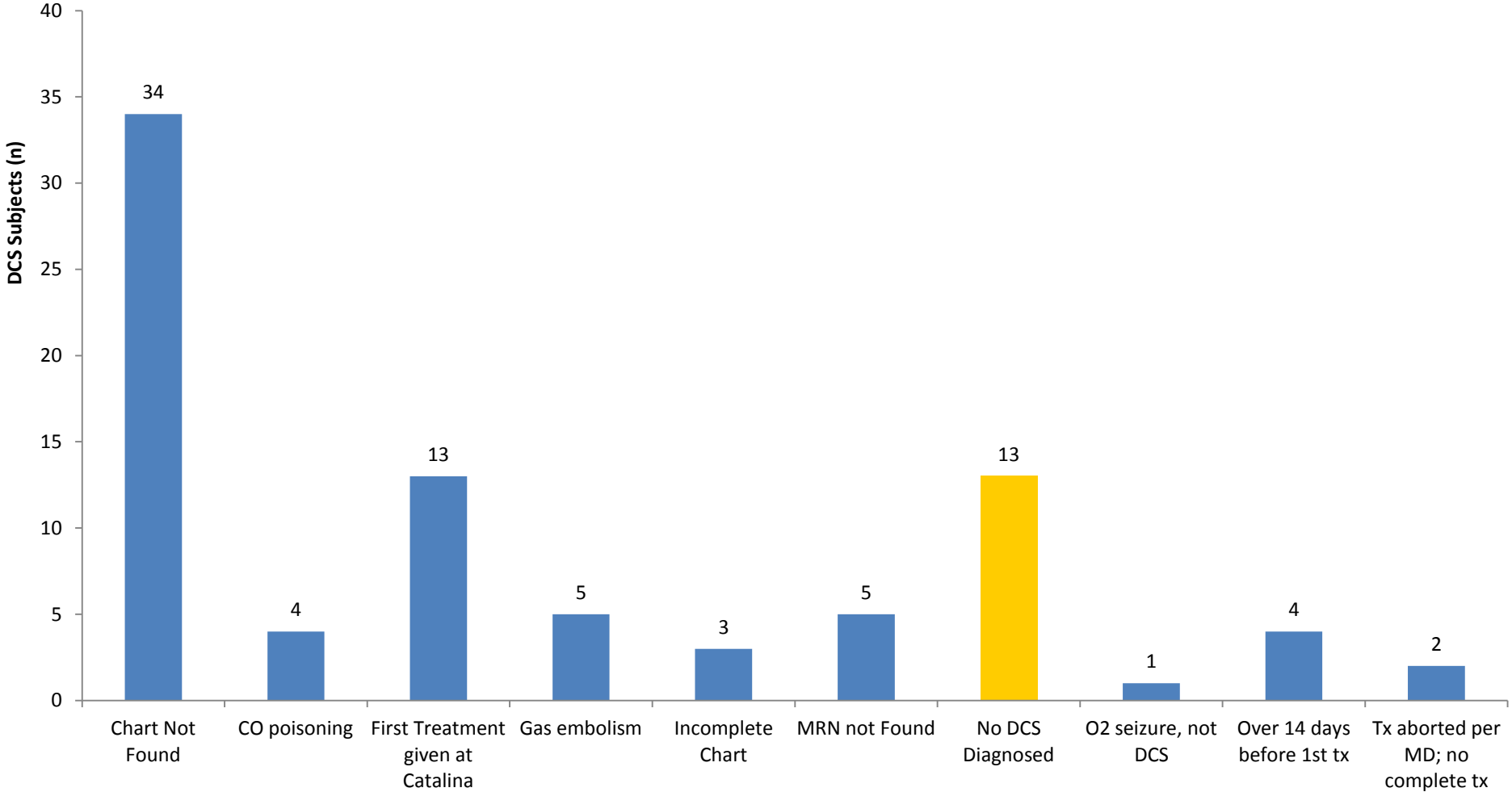
- Would we be able to identify predictive variables that:
  1. Identify group membership
  2. Elucidate our outcomes

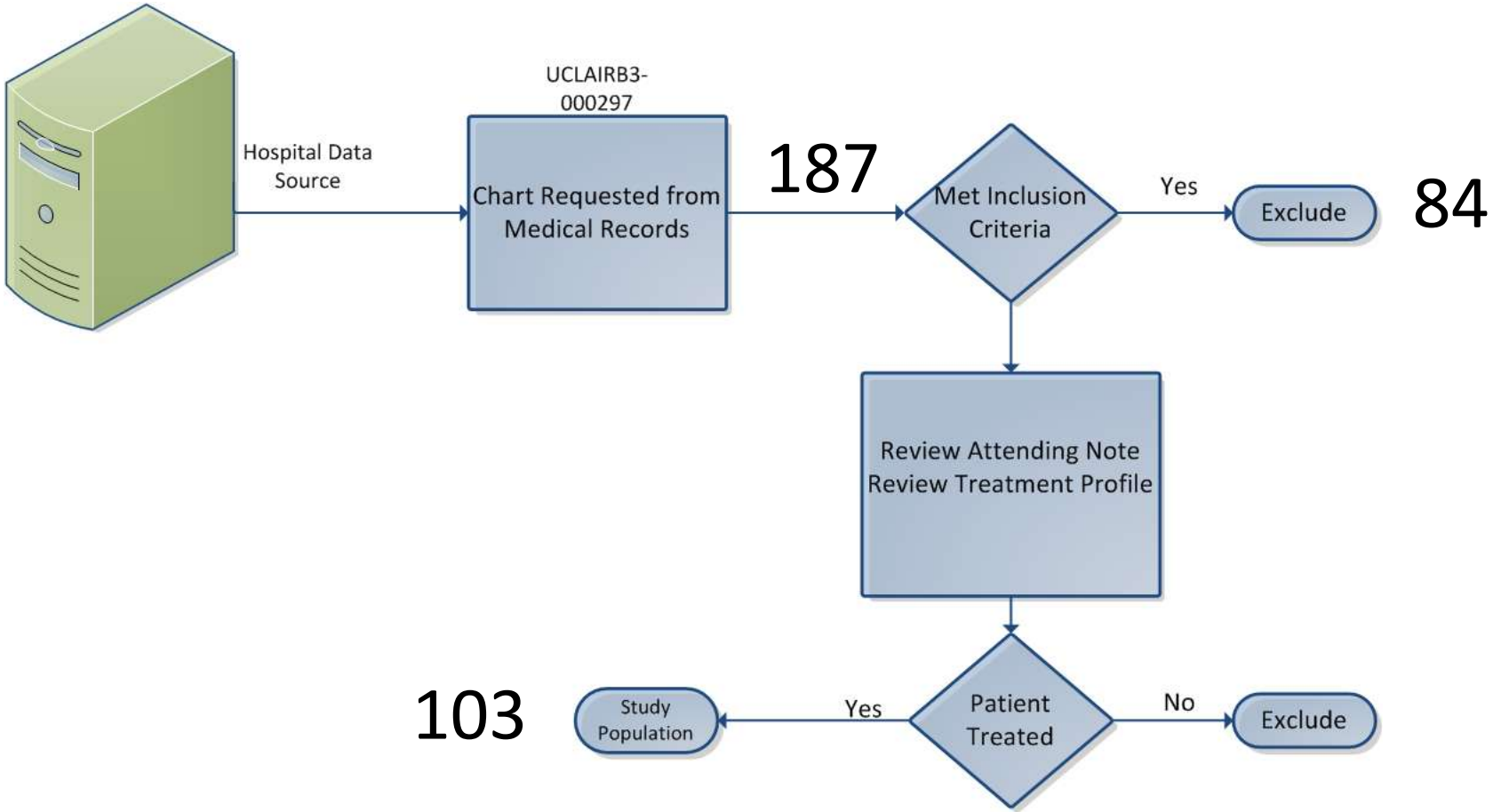
Methods


Hospital Data Source
UCLAIRB3-000297
Chart Requested from Medical Records
187
Met Inclusion Criteria
Yes
Exclude
84
Review Attending Note
Review Treatment Profile
Patient Treated
Yes
Study Population
No
Exclude

Excluded (N =84)



Methods


UCLAIRB3-000297
Hospital Data Source
Chart Requested from Medical Records
187
Met Inclusion Criteria
Yes
Exclude
84
Review Attending Note
Review Treatment Profile
103
Study Population
Yes
Patient Treated
No
Exclude

Methods

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- Single Center Retrospective Chart Review
- 103 Subjects
- Data coded and extracted from
  - Treatment Profiles
  - Attending Notes
  - Nursing Notes
  - Technician Notes

Methods

Review of all 103 Medical Charts Data Extracted and Coded

2nd Review of all 103 Medical Charts Data Extracted and Coded

Variables

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Demographics	Dive Profiles	Symptoms	Therapy
Age	Depth	Location	Delay
Gender	TBT	Onset	Amount
Height/Weight	# Dives	Type of DCS	Initial/Final Outcome


74 %
of divers were Male
(n=103)
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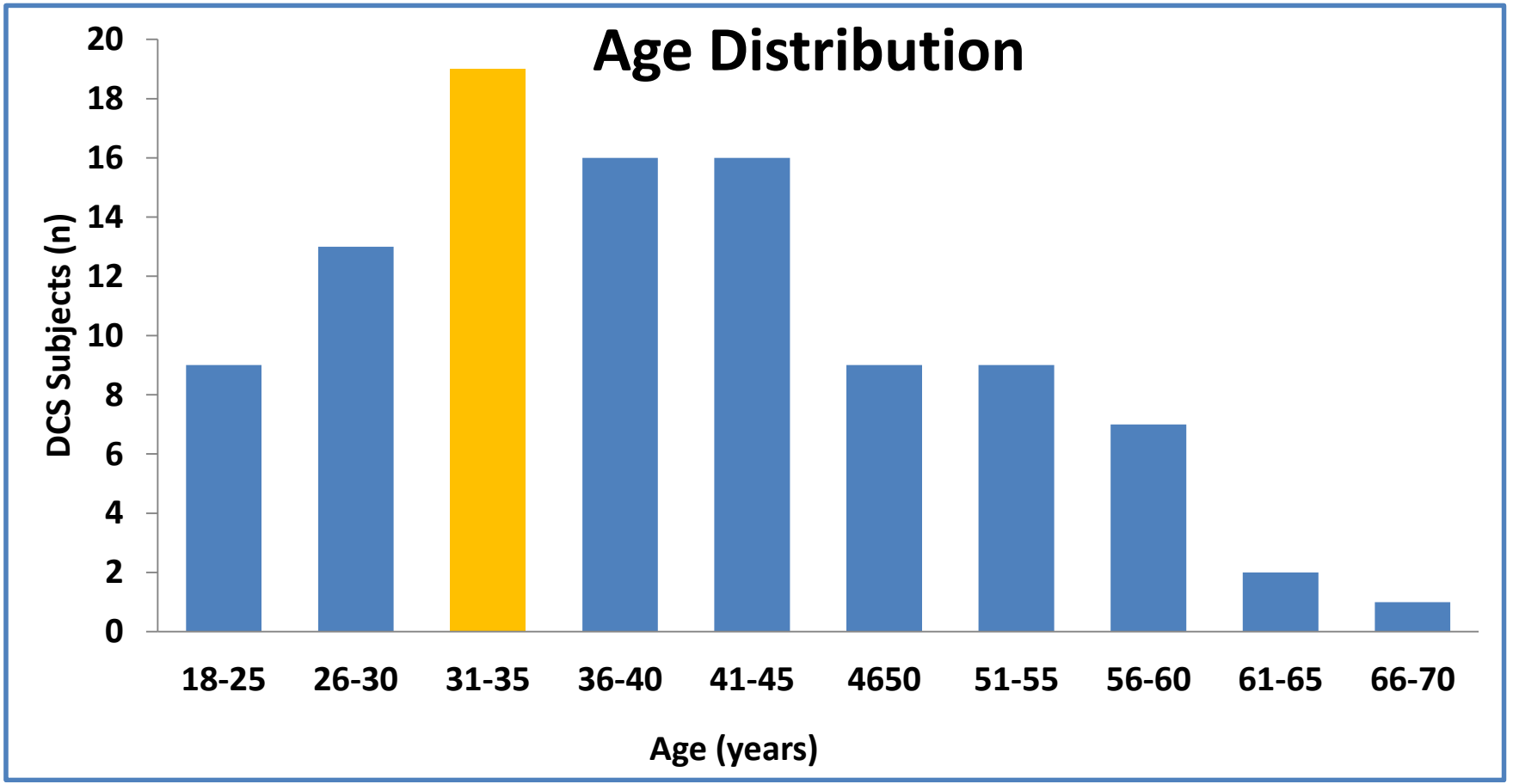
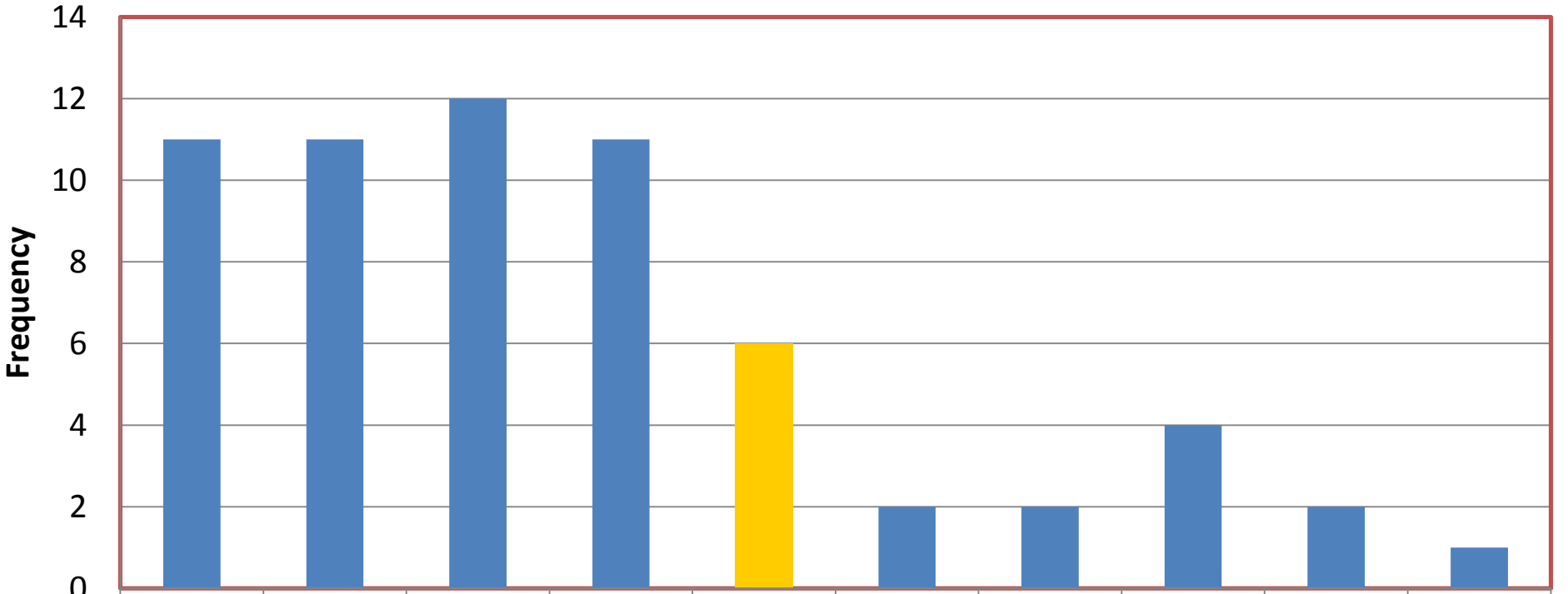

Age Distribution
DCS Subjects (n)
20
18
16
14
12
10
8
6
4
2
0
18-25
26-30
31-35
36-40
41-45
4650
51-55
56-60
61-65
66-70
Age (years)

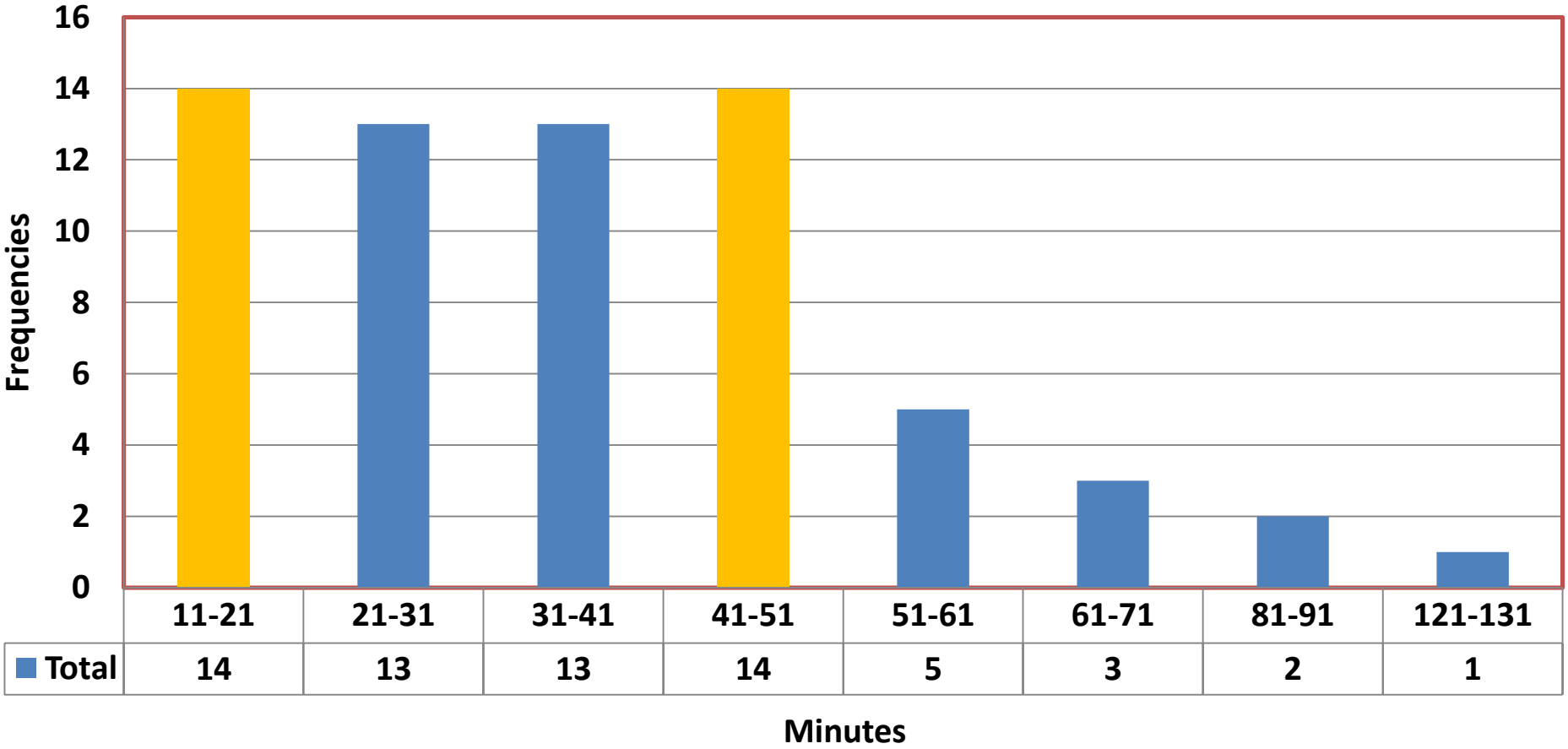
Reported Depths of Dives
N = 99



	20-39	40-59	60-79	80-99	100-119	120-139	140-159	160-179	180-199	220-240
Total	11	11	12	11	6	2	2	4	2	1

Depths(FSW)

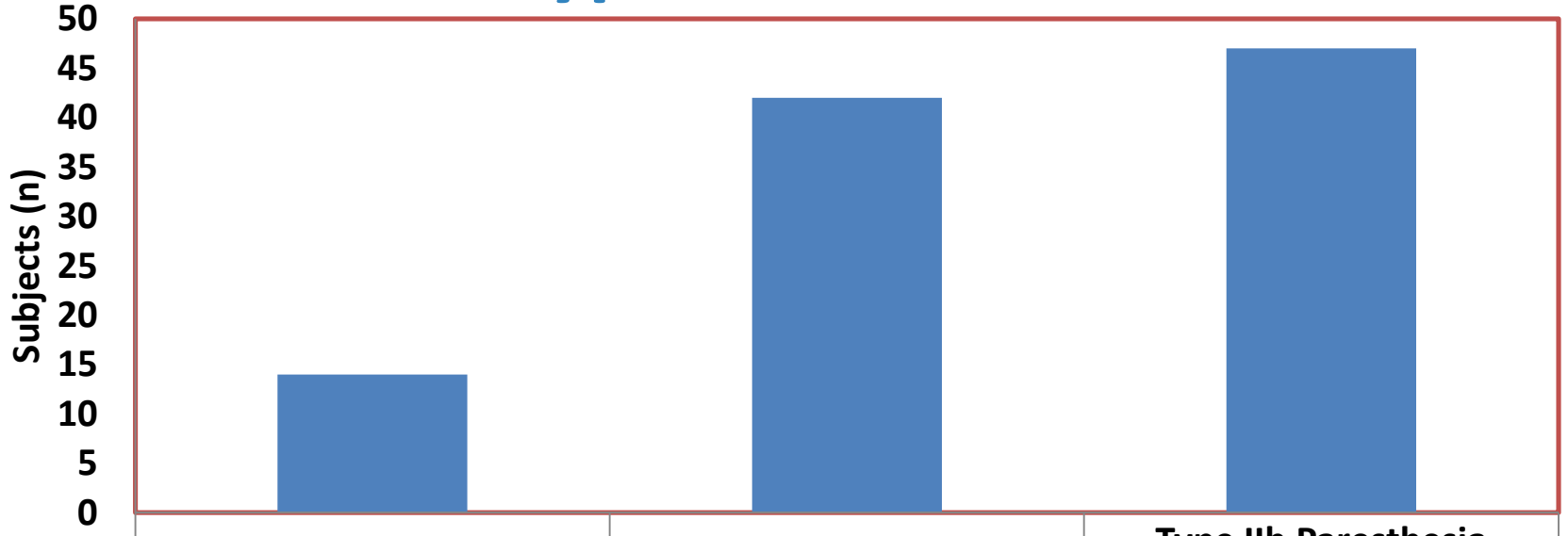
Reported Bottom Times
N =65



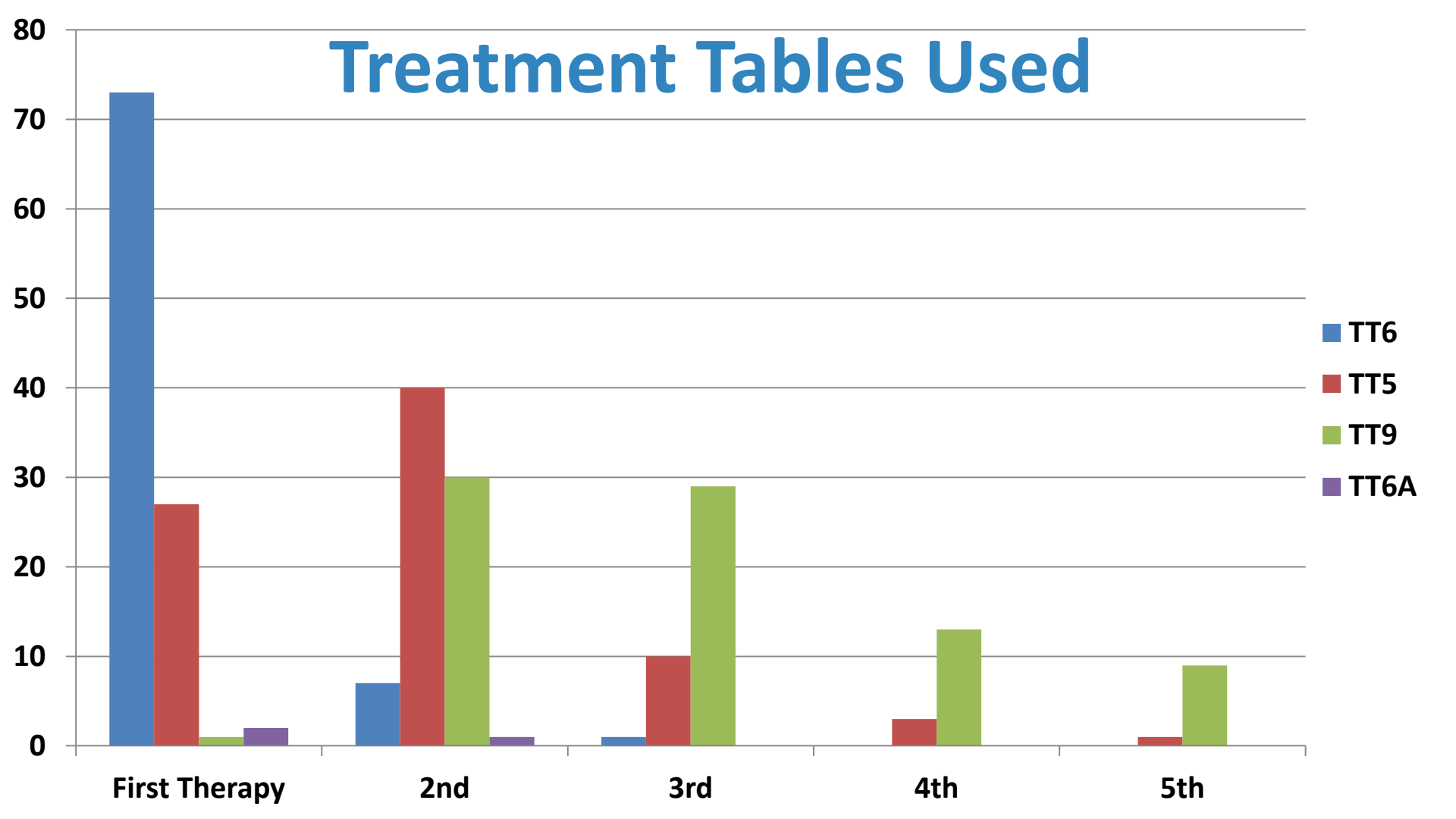
Type of DCS

- **Type I**: pain only
- **Type IIa**: single organ system paresthesia
- **Type IIb**: multiple organ system paresthesia
  (ex. Tingling of hands and a headache)

Type of DCS



	Type I	Type IIa Paresthesia (Tingling or Numbness combined with pain)	Type IIb Paresthesia (Cerebral, Spinal, Cerebro-Spinal, Systemic)
Total	14	42	47


Treatment Tables Used
80
70
60
50
40
30
20
10
0
First Therapy
2nd
3rd
4th
5th
TT6
TT5
TT9
TT6A

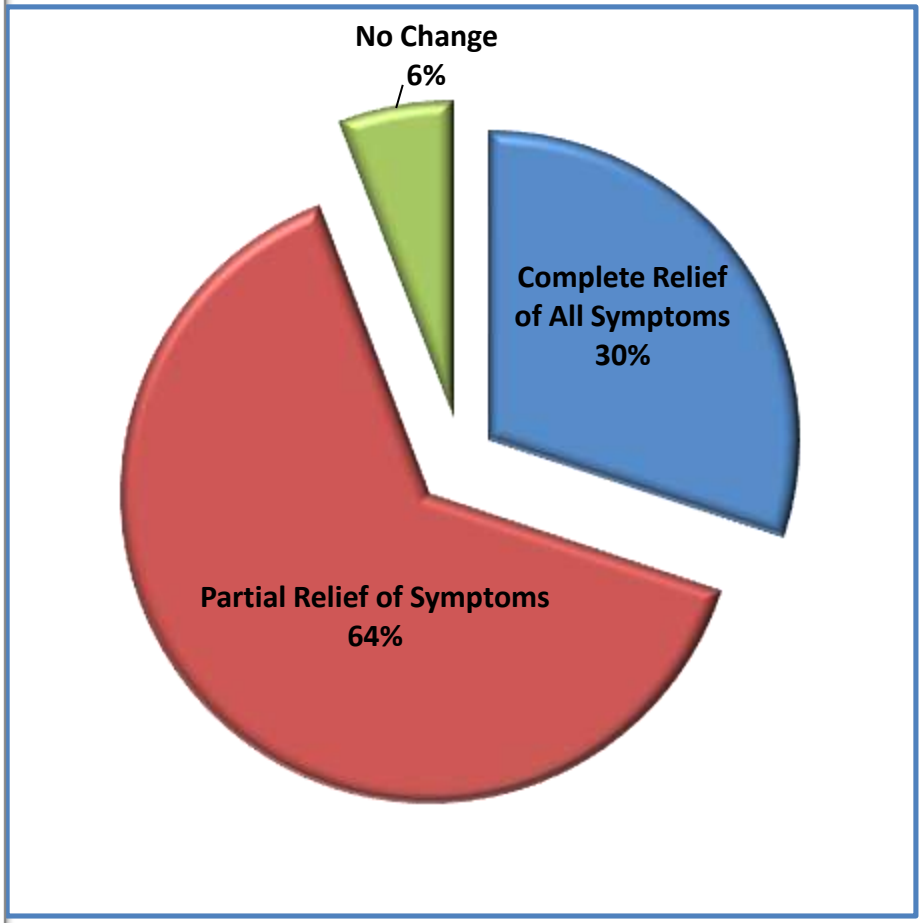
Definition of Outcome

- **Complete Relief**: patient felt back to “normal” (same as pre-DCS event)

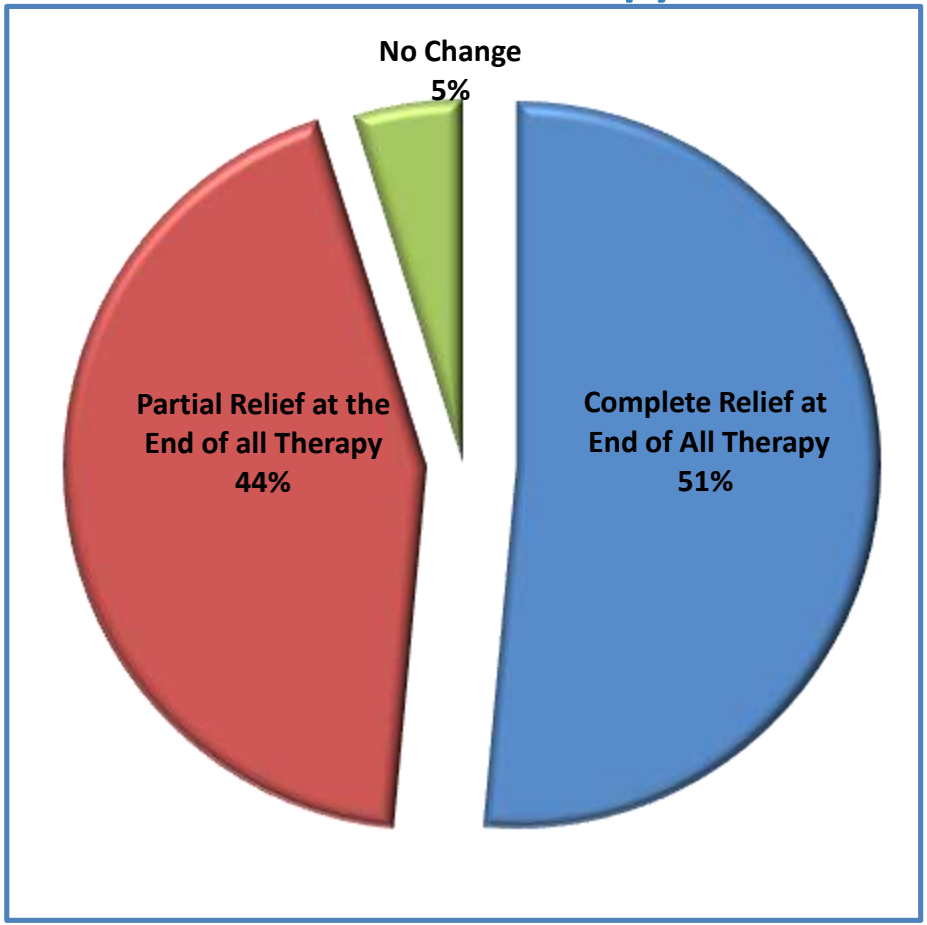
- **Partial Relief**: patient felt better post-DCS but not 100% back to “normal”

- **No Change**: patient felt no relief

Outcome First Therapy



Outcome Final Therapy



Comparison by at first Therapy

Groups	N	Depth FSW	Treatments	Reponses time at 60 FSW in Minutes	Age (Years)	Dives	Delay in tx (Hours)
Partial Relief	53	75.65	2.60	25.43	35.72	3.39	34.30
Complete Relief	26	69.83	1.81	10.84	39.94	3.12	37.39

Comparison at End of All Therapy

Groups	N	Depth FSW	Treatments	Reponses time at 60 FSW in Minutes	Age (Years)	Dives	Delay in tx (Hours)
Partial Relief	35	86.76	2.72	20.69	39.54	3.41	38.70
Complete Relief	42	63.65	2.02	20.23	37.42	3.19	34.71

Analysis By Groups
Partial Relief and Mix Partial and Complete

Groups	N	Depth FSW	Treatments	Reponses time at 60 FSW in Minutes	Age (Years)	Dives	Delay in tx (Hours)
2-2	29	**82.71**	2.79	23.89	39.75	3.57	34.76
2-1	23	**68.17**	2.39	26.96	39.56	3.17	41.17

Partial Relief = 2
Complete Relief = 1

Statistical Analysis

- SPSS Package
  - Normality Testing on all variables
  - Homogeneity of Variance
  - Spearman Rank Correlation
  - Logistic Regression

Spearman Rank: Correlation

Variables	N	P	rho
Outcome of first therapy and Change of symptoms with compression	103	0.031	0.212
Final symptom Outcome and Amount of therapy	89	0.000	0.223
Final symptom Outcome and Type DCS	103	0.001	0.243
Outcome of first therapy and Amount of therapy	89	0.001	0.382
Final Symptom outcome and Outcome of first therapy	103	0.000	0.448

Predictive Variables

- Outcome
  - Complete Relief
  - Partial Relief

- Predictors
  - Depth on first dive
  - Outcome on first therapy

Logistic Regression Model Assessment

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	6.842	8	.554

Logistic Regression : Null

Classification Table[a,b]

Observed			Predicted		
			Outcome_End		
			Partial Relief	Complete Relief	Percentage Correct
Step 0	Outcome_End	Partial Relief	0	42	.0
		Complete Relief	0	50	100.0
	Overall Percentage				54.3

a. Constant is included in the model.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	.174	.209	.694	1	.405	1.190

Predictors

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Outcome1(1)	10.636	1	.001
		Depth_1	7.037	1	.008
		Overall Statistics	16.053	2	.000

Logistic Regression Results

Classification Table[a,b]

Observed			Predicted		
			Outcome_End		
			Partial Relief	Complete Relief	Percentage Correct
Step 0	Outcome_End	Partial Relief	0	42	.0
		Complete Relief	0	50	100.0
	Overall Percentage				54.3

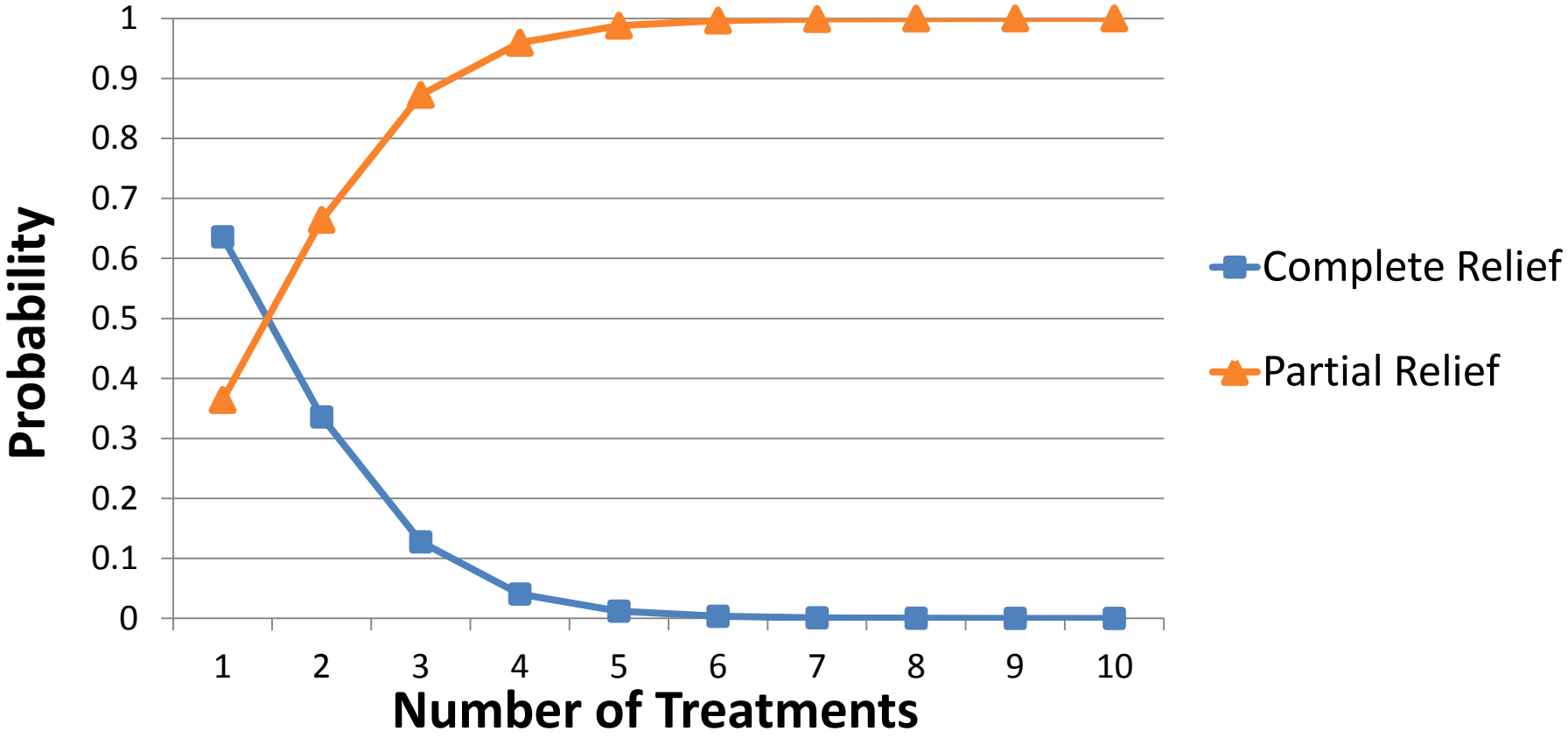
a. Constant is included in the model.

b. The cut value is .500

Observed			Predicted		
			Outcome_End		
			Partial Relief	Complete Relief	Percentage Correct
Step 1	Outcome_End	Partial Relief	29	13	69.0
		Complete Relief	16	34	68.0
	Overall Percentage				68.5

a. The cut value is .500

Predicted Probability of Complete vs. Partial Resolution at First Therapy



Conclusion

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- Average response time to symptom relief during first treatment
  - 21 minutes (vs. 10 minutes)

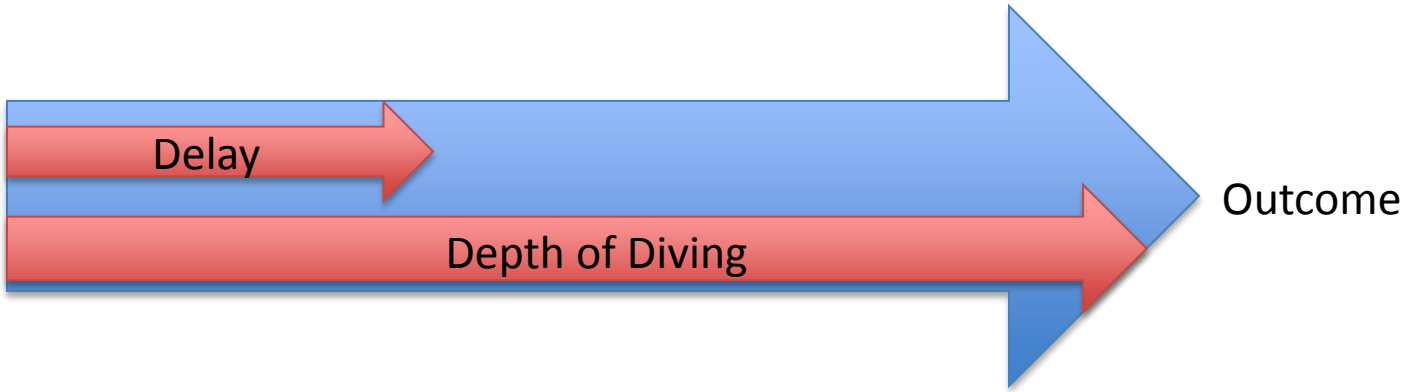
- Predictor variables
  - Depth of 1st dive
  - Outcome of first therapy

- After **4** visits response tapers off.

- 51% of divers achieved complete relief
- 44% of divers achieved partial relief

Discussion

- Delay might be a factor in outcome within a set window of time
- Past a set window of time, depth on first dive might be a better predictor



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Thank You