Sternal Precautions: Time for a Change?

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List of Sternal Precautions

- 1. No lifting/pushing/pulling > 5-10lbs
- 2. No shoulder flexion >90
- 3. No reaching behind back with B UE
- 4. Use pillow for coughing/sneezing

Sternal Precautions

- In general, sternal precautions are very restrictive.
- Beyond imposing arbitrary load restrictions, they often prohibit common shoulder joint and shoulder girdle movements
- Healing and remodeling of connective tissue, **including bone**, requires appropriate loading
- Because of the implementation of these restrictions **patients often require assistance** from the nursing staff, the therapy team, or family members **to complete basic bed mobility, transfers and ADLs.**

Forces with ADLs

- Adams and colleagues measured the force required to complete 32 activities of daily living and found that a majority of them elicited forces greater than the 10 lbs.
  - Lifting a gallon of milk from refridgerator (10 lbs)
  - Pushing a glass door to exit hospital (22 lbs)
  - Coughing 60-lbs (>lifting two 20-lb weights simultaneously)
  - Sneeze exerted force of 90-lbs

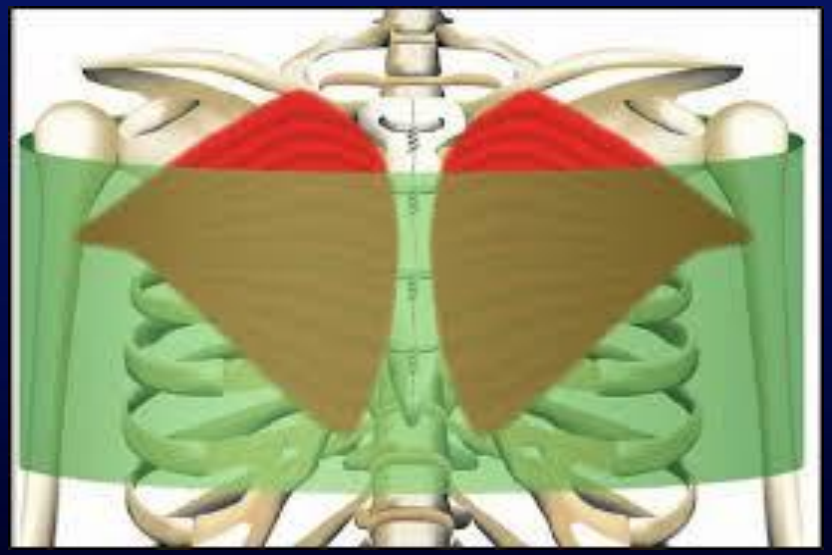
(10,11,12)

Evidence?

- There is no direct evidence linking postoperative activity level or arm movement to increased risk for sternal complications. (3)
- Most of what is currently done in clinical practice is based on anecdotal/indirect evidence and expert opinion. (3)
- Which has led to a plethora of protocols.
- Most with conflicting advice. Vary widely from among hospitals and rehab centers.

Tube Theory

- *Keep Your Move in the Tube* is based on the ergonomics that shorten the length of the outstretched arm (lever arm reduction).
- Enables patients to perform previously contraindicated movements.



Tube Theory

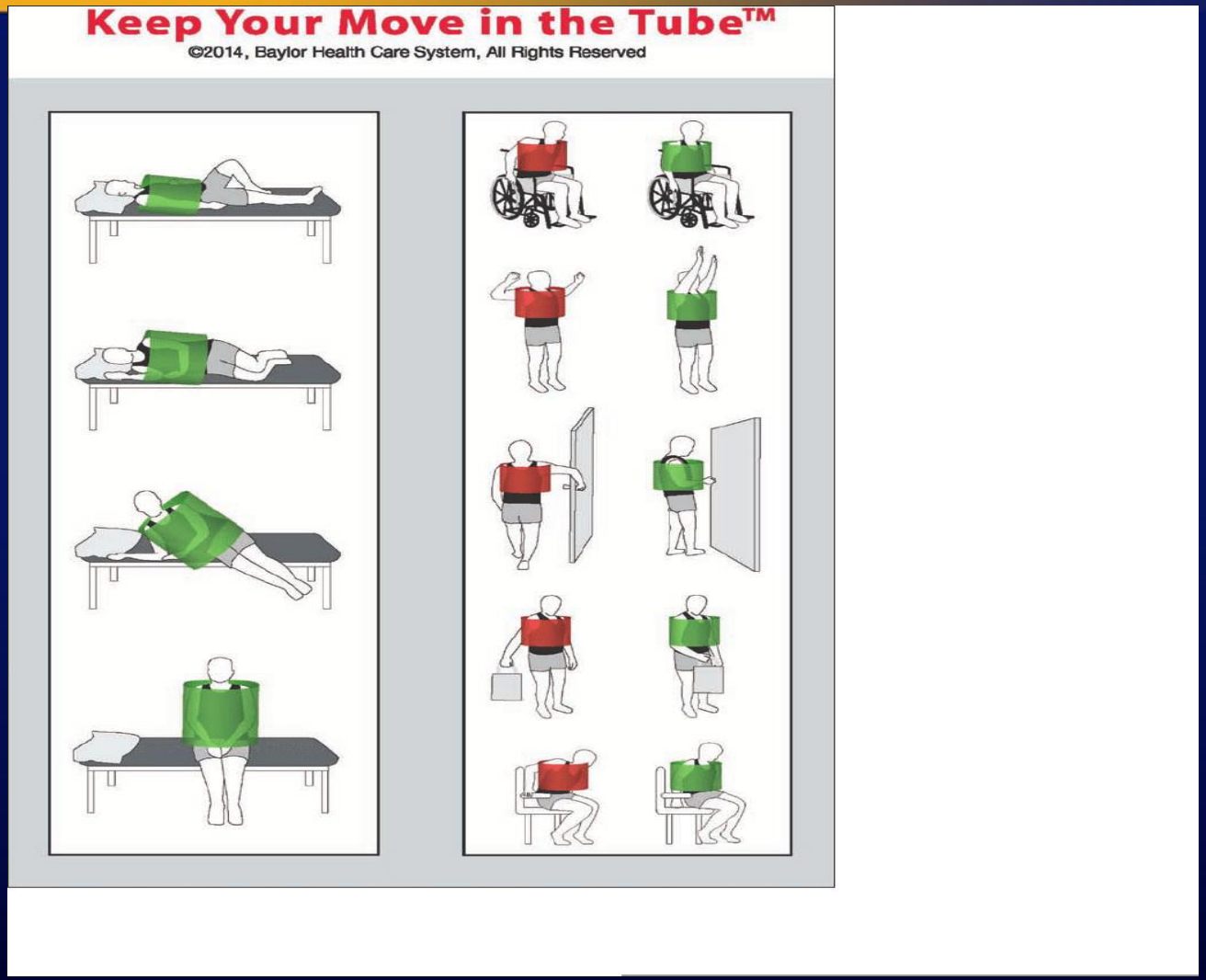
- By keeping their upper arms close to their body, as if they were inside an imaginary truncal tube, patients can modify load-bearing movements and thus avoid excessive stress to the sternum.
- More specifically, limiting the movement of the humerus minimizes the lateral pull on the sternum and decreases the leverage of the hand and forearm during load-bearing actions such as rolling a wheelchair, opening a heavy door, or lifting a toolbox.
- However, for **non–load-bearing** activities such as personal hygiene, patients are allowed to reach "out of the tube" (above the head, out to the side, or behind the back).

“Move in the Tube”

- *Keep Your Move in the Tube*, enables patients to use their arms and thus perform bed mobility and transfers more efficiently, which may increase the likelihood that they will be discharged to their home.
- Patients allowed to resume their normal load-bearing activities at their own pace, within pain-free limits, as long as they stay “in the tube.”

“Move in the Tube”

Credit: Baylor University Medical Center



MEMORIAL HERMANN

OUTLIER CASES	Prior to Change				Process Change						Grand Total	All Other w/o PT	Total Cases
	Jan-17	Feb-17	Mar-17	Period Total	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Period Total			
Cases	14	30	27	71	21	33	26	35	37	152	**223**	13	236
CMI per case	10.58	9.33	9.66	9.70	9.98	12.14	10.15	9.39	9.12	10.20	**10.03**	11.87	10.14
ALOS	31.14	30.87	24.93	28.66	27.10	47.39	29.23	39.14	29.16	35.14	**33.08**	16.69	32.18
ALOS (CMI Adj.)	2.94	3.31	2.58	2.95	2.72	3.90	2.88	4.17	3.20	3.45	**3.30**	1.41	3.17
GM_LOS	13.34	12.41	12.73	12.71	13.34	15.22	13.52	12.33	12.01	13.22	**13.06**	16.16	13.23
Opp. Days per case	17.81	18.46	12.20	15.95	13.75	32.18	15.71	26.81	17.15	21.92	**20.02**	0.53	18.95
T-ALOS[1]	19.57	21.13	16.52	19.07	16.48	33.42	21.88	26.06	19.30	23.97	**22.41**		
Pre-T LOS[2]	9.86	8.13	6.44	7.83	7.86	11.18	6.23	10.03	8.00	8.84	**8.52**		
Post-T LOS[3]	1.71	1.60	1.96	1.76	2.81	2.79	1.15	3.09	1.86	2.36	**2.17**		

NON-OUTLIER CASES	Prior to Change				Process Change						Grand Total	All Other w/o PT	Total Cases
	Jan-17	Feb-17	Mar-17	Period Total	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Period Total			
Cases	31	38	62	131	55	61	46	49	40	251	**382**	38	420
CMI per case	6.31	7.27	5.82	6.35	7.31	7.03	6.82	6.41	7.23	6.95	**6.73**	5.50	6.63
ALOS	8.71	10.68	9.84	9.82	9.65	9.15	10.35	10.57	9.38	9.79	**9.80**	4.29	9.30
ALOS (CMI Adj.)	1.38	1.47	1.69	1.54	1.32	1.30	1.52	1.65	1.30	1.41	**1.46**	0.78	1.40
GM_LOS	8.28	9.56	8.26	8.64	9.98	9.70	9.57	9.13	9.51	9.60	**9.27**	8.51	9.20
Opp. Days per case	0.43	1.12	1.58	1.17	(0.33)	(0.55)	0.77	1.44	(0.14)	0.20	**0.53**	(4.22)	0.10
T-ALOS[1]	4.81	6.08	5.56	5.53	5.93	5.21	5.93	5.69	5.25	5.60	**5.58**		
Pre-T LOS[2]	2.84	3.95	3.02	3.24	2.89	2.77	3.41	2.94	2.75	2.94	**3.05**		
Post-T LOS[3]	1.16	0.66	1.32	1.09	0.85	1.18	1.02	1.98	1.43	1.27	**1.21**		

Note: [1] Average Length of Stay during Therapy periods

[2] Average Length of Stay between admit and first therapy date

[3] Average Length of Stay between last therapy date and discharge date

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	Prior to Change				Process Change							Grand Total	All Other w/o PT	Total Cases
OUTLIER CASES	Jan-17	Feb-17	Mar-17	Period Total	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Period Total			
ses	14	30	27	71	21	33	26	35	42	29	186	**257**	17	274
l per case	10.58	9.33	9.66	9.70	9.98	12.14	10.15	9.39	9.26	10.48	10.19	**10.06**	12.71	10.22
OS	31.14	30.87	24.93	28.66	27.10	47.39	29.23	39.14	28.21	28.31	33.70	**32.31**	23.12	31.74
OS (CMI Adj.)	2.94	3.31	2.58	2.95	2.72	3.90	2.88	4.17	3.05	2.70	3.31	**3.21**	1.82	3.11
_LOS	13.34	12.41	12.73	12.71	13.34	15.22	13.52	12.33	12.08	13.80	13.30	**13.13**	17.12	13.38
p. Days per case	17.81	18.46	12.20	15.95	13.75	32.18	15.71	26.81	16.13	14.51	20.41	**19.18**	6.00	18.36
ALOS[1]	19.57	21.13	16.52	19.07	16.48	33.42	21.88	26.06	18.26	20.79	23.12	**22.00**		
e-T LOS[2]	9.86	8.13	6.44	7.83	7.86	11.18	6.23	10.03	8.10	6.52	8.47	**8.30**		
st-T LOS[3]	1.71	1.60	1.96	1.76	2.81	2.79	1.15	3.09	1.86	1.00	2.13	**2.03**		

	1	2	3		4	5	6	7	8	9				
	Prior to Change				Process Change							Grand Total	All Other w/o PT	Total Cases
NON-OUTLIER CASES	Jan-17	Feb-17	Mar-17	Period Total	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Period Total			
ses	31	38	62	131	55	61	46	50	41	50	303	**434**	40	474
l per case	6.31	7.27	5.82	6.35	7.31	7.03	6.82	6.83	7.28	7.08	7.06	**6.85**	6.51	6.82
OS	8.71	10.68	9.84	9.82	9.65	9.15	10.35	10.92	9.24	11.38	10.10	**10.01**	5.45	9.63
OS (CMI Adj.)	1.38	1.47	1.69	1.54	1.32	1.30	1.52	1.60	1.27	1.61	1.43	**1.46**	0.84	1.41
_LOS	8.28	9.56	8.26	8.64	9.98	9.70	9.57	9.54	9.43	9.85	9.69	**9.38**	9.33	9.37
p. Days per case	0.43	1.12	1.58	1.17	(0.33)	(0.55)	0.77	1.38	(0.19)	1.53	0.40	**0.64**	(3.88)	0.25
ALOS[1]	4.81	6.08	5.56	5.53	5.93	5.21	5.93	5.84	5.17	6.34	5.74	**5.68**		
e-T LOS[2]	2.84	3.95	3.02	3.24	2.89	2.77	3.41	3.16	2.71	4.14	3.17	**3.19**		
st-T LOS[3]	1.16	0.66	1.32	1.09	0.85	1.18	1.02	1.96	1.41	0.94	1.22	**1.18**		

Note: [1] Average Length of Stay during Therapy periods

[2] Average Length of Stay between admit and first therapy date

[3] Average Length of Stay between last therapy date and discharge date

Conclusion:

- Traditional SP that are currently provided to patients after a median sternotomy are more restrictive than precautionary.
- A precautionary approach rather than restrictive approach is likely to better facilitate optimal sternal healing and functional recovery after a median sternotomy.
- Current restrictive SP may be related to the poorer outcomes that have been observed in patients after median sternotomy.
- Therefore, SP that focus on function and patient characteristics may be more likely to facilitate recovery after median sternotomy and less likely to impede it.

Questions?

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