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OA/ID Number: 52066
Folder ID Number: 52066-006

Folder Title:
[TIRR - Strategic Plan Development] [1990-1991]

Stack: **Row:** **Section:** **Shelf:** **Position:**

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xc: Charlie Beall
Lee Freiden
file original
"Strategic Planning"
LA

M E M O R A N D U M

DATE: February 27, 1991

TO: Louisa Adelung

FROM: Elizabeth Englett EE

RE: Meeting with Dr. Shenaq concerning surgery services at TIRR

I met with Dr. Shenaq on 2/27/91 concerning surgery services at TIRR and it appears to me that he has two basic requests.

1. To have surgery services as a whole looked at in a new dimension. He is requesting to have a profitability study prepared and analyzed for all of surgery, but breaking out plastics. There appears to be some confusion surrounding the payor mix for surgery services. It would be beneficial to determine the percentage of Medicare in the mix.

2. To package all of the surgery services being offered under one umbrella to be described as "Restorative Surgery Services". There are numerous benefits I can see in packaging and marketing this service.

As discussed last week in our debriefing meeting, we can expect to see an increase in referrals of patients who have been rehabilitated in other facilities and then sent to TIRR with complications. Dr. Shenaq's services would be extremely beneficial in these circumstances. We also discussed the fact that we must reach out to the community asking how TIRR can meet their needs. It is my opinion that while we do need to develop new services we also need to simply communicate what we are now providing with surgery being one of the highlights. In addition, it is my understanding that the medical community within TMC and certainly greater Houston are not aware of our surgery capabilities and the expertise that we now have available to us with the affiliation of Dr. Shenaq. By packaging these services and promoting Dr. Shenaq, we can generate referrals and improve our image in the medical community.

Considering that a major emphasis is being placed on strategic planning for the Institute, I feel that Dr. Shenaq's interest in further developing these services is very timely and can prove very beneficial to our future success.

cc: Dr. Shenaq
EE4-51

MEMORANDUM

DATE: March 14, 1991

TO: Louisa Adelung

FROM: Pat Schaefer Pat

RE: Texas Rehabilitation Facilities

HOUSTON - Free Standing Facilities

Houston Rehab Institute
Del Oro Rehab
Health South Rehab
Memorial City Rehab
Plaza Rehab Hospital @ Kingwood
Neurobehavioral Institute of Houston
Cypress Creek Neurobehavorial Institute

HOUSTON - Rehab Units within hospitals

St. Luke's
Hermann
Methodist
Ben Taub
Memorial Systems:
  Southwest
  Southeast
  Northwest
  Northeast
Twelve Oaks
Heights
St. Joseph's
Bayshore
Rosewood
St. John's
Sharpstown
Doctor's Hospital Conroe

HOUSTON - Outreach

Transitional Learning Community (Galveston Living Community)
Project Re-Entry (Major competitor of Challenge Program)

UNDER CONSTRUCTION

Rehab Hospital of SW Texas - Clear Lake
Devereaux - Texas City

14-FEB-91
11:38

YTD REFERRAL SUMMARY FOR DEC-1990

ALI

REF

OTHER =

							CLOSED				
		in pt	out pt	pending	closed		deceased	inappropriate	pending	home	rehab other
MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	3	2	0	0	1	0	0	1	0	0	0
FEB	3	1	0	0	2	0	0	0	1	0	1
MAR	28	11	8	0	9	0	0	0	5	0	4
APR	32	12	9	0	11	0	0	3	5	1	2
MAY	21	8	4	0	9	0	0	2	4	1	2
JUN	26	11	7	0	8	0	0	3	1	1	3
JUL	26	10	10	0	6	0	0	1	3	0	2
AUG	30	12	9	0	9	0	0	0	3	2	4
SEP	23	9	8	0	6	0	2	1	0	0	3
OCT	33	8	7	0	18	0	0	4	7	2	5
NOV	26	9	7	1	9	0	0	2	4	3	0
DEC	20	3	8	2	7	0	0	4	0	0	3
TOT	271	96	77	3	95	0	2	21	33	10	29

PRG	OTH	AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
0	0	14	2	100	0	0	3	0	31	3	0	0	93	25

Valerie Hermann
=BUFFUM/SW

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	2	1	0	0	1	0	0	0	0	1	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	2	1	1	0	0	0	0	0	0	0	0
APR	4	2	0	0	2	0	0	0	0	1	1
MAY	4	4	0	0	0	0	0	0	0	0	0
JUN	2	2	0	0	0	0	0	0	0	0	0
JUL	1	1	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	3	1	0	0	2	0	0	0	0	0	2
OCT	6	5	1	0	0	0	0	0	0	0	0
NOV	3	2	1	0	0	0	0	0	0	0	0
DEC	2	2	0	0	0	0	0	0	0	0	0
TOT	29	21	3	0	5	0	0	0	0	2	3

PRG	OTH	AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
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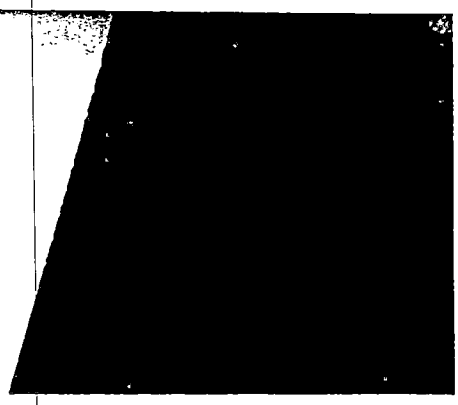


Cara TMH
=DELGADO/SW

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	3	2	0	0	1	0	0	0	0	0	1
MAR	2	2	0	0	0	0	0	0	0	0	0
APR	1	0	0	0	1	0	0	0	1	0	0
MAY	3	2	0	0	1	0	0	1	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	9	6	0	0	3	0	0	1	1	0	1

PRG	OTH==	==AM	==AR	==BI	==BP	==HN	==NM	==OT	==PD	==PM	==PO	==SA	==SC	==SK=
	0	0	0	6	0	0	0	0	0	0	0	0	2	1

Melinda UTMB
=DROLL/SW

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	1	0	0	0	1	0	0	0	0	0	1
APR	1	1	0	0	0	0	0	0	0	0	0
MAY	1	0	0	0	1	0	0	0	0	0	1
JUN	2	0	1	0	1	0	0	0	0	0	1
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	5	1	1	0	3	0	0	0	0	0	3

PRG	OTH==	==AM	==AR	==BI	==BP	==HN	==NM	==OT	==PD	==PM	==PO	==SA	==SC	==SK=
	0	0	0	4	0	0	0	0	0	0	0	0	1	0

Stephen 6410 Farmin

=FLETCHER/MD

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0
MAY	2	2	0	0	0	0	0	0	0	0	0
JUN	3	2	1	0	0	0	0	0	0	0	0
JUL	1	1	0	0	0	0	0	0	0	0	0
AUG	4	3	0	0	1	0	0	0	0	0	1
SEP	2	1	0	0	1	0	0	0	0	0	1
OCT	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	12	9	1	0	2	0	0	0	0	0	2

PRG	OTH==	==AM	==AR	==BI	==BP	==HN	==NM	==OT	==PD	==PM	==PO	==SA	==SC	==SK=
	0	0	0	0	3	0	0	0	0	3	0	0	0	6	0

Jane BTGH

=FONTENETTE/SW

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	1	0	1	0	0	0	0	0	0	0	0
MAR	4	0	0	0	4	0	2	0	2	0	0
APR	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0
JUN	1	1	0	0	0	0	0	0	0	0	0
JUL	1	0	0	0	1	0	0	0	1	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	1	1	0	0	0	0	0	0	0	0	0
NOV	4	0	0	0	4	0	0	0	3	1	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	12	2	1	0	9	0	2	0	6	1	0

PRG	OTH==	==AM	==AR	==BI	==BP	==HN	==NM	==OT	==PD	==PM	==PO	==SA	==SC	==SK=
	0	0	0	0	7	0	0	0	0	1	0	0	0	4	0

Jerri Hernandez

=FROST=SW

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	2	0	0	0	2	0	0	0	2	0	0
APR	2	1	0	0	1	0	0	0	1	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0
JUN	2	1	0	0	1	0	0	0	0	1	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	1	1	0	0	0	0	0	0	0	0	0
OCT	2	0	0	0	2	0	0	0	0	0	2
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	9	3	0	0	6	0	0	0	3	1	2

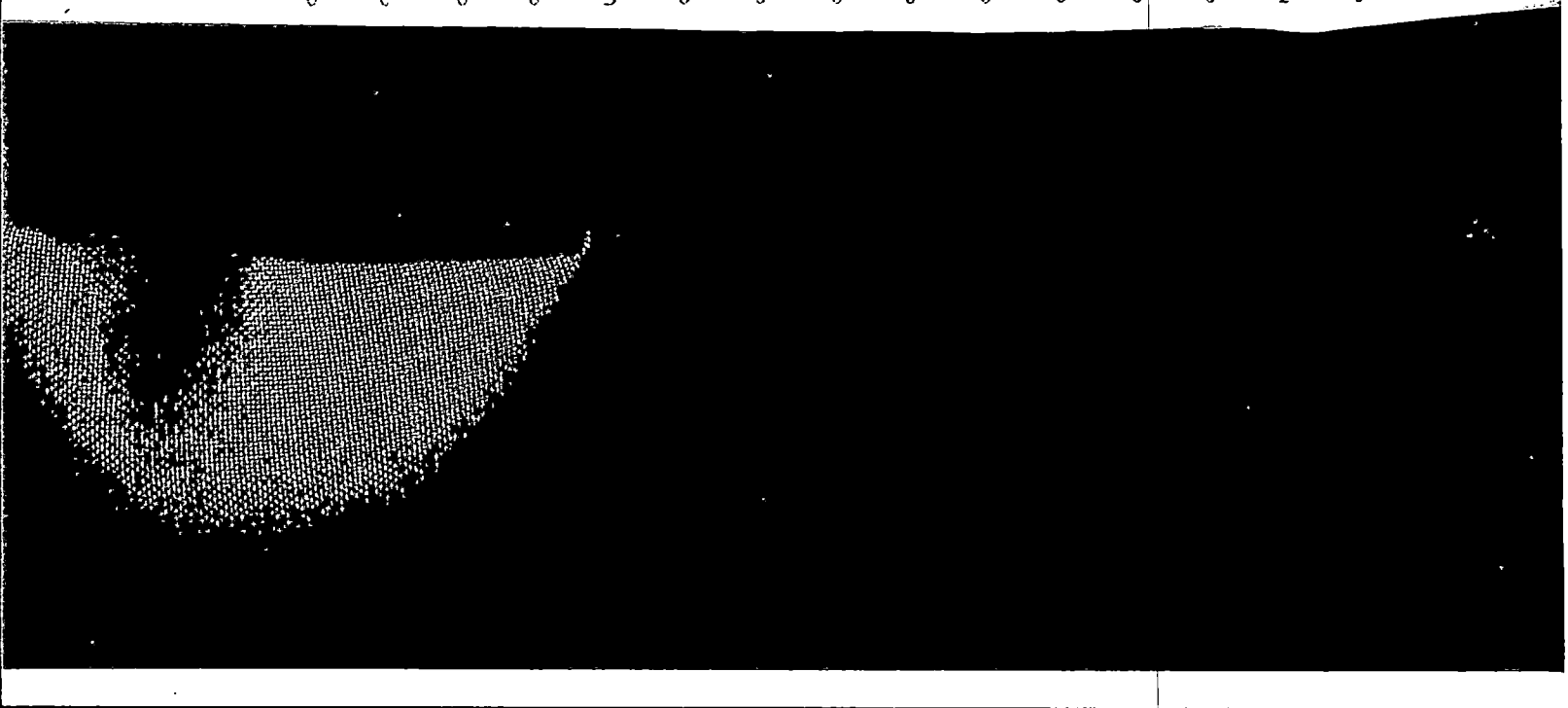
PRG.	OTH==	==AM	==AP	==BI	==BP	==HN	==NM	==OT	==PD	==PM	==PO	==SA	==SC	==SK=
	0	0	0	0	0	0	0	0	9	0	0	0	0	0

Ferrara 6550 Farrier

=GLENNON IMD

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	1	1	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	1	0	0	0	1	0	0	0	1	0	0
APR	1	1	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	1	1	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	4	3	0	0	1	0	0	0	1	0	0

PRG	OTH==	==AM	==AP	==BI	==BP	==HN	==NM	==OT	==PD	==PM	==PO	==SA	==SC	==SK=
	0	0	0	0	3	0	0	0	0	0	0	0	1	0



Dave
=HESLER/SW

Park Plaza

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0
MAY	2	2	0	0	0	0	0	0	0	0	0
JUN	2	0	0	0	2	0	0	1	0	1	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	4	2	0	0	2	0	0	1	0	1	0

PRG	OTH	AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
	0	0	0	1	0	0	0	0	0	0	0	0	1	2

Daval
=HOLDREN/CM

TEIA

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0
MAY	1	0	0	0	1	0	0	1	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	1	1	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	2	1	0	0	1	0	0	1	0	0	0

PRG	OTH	AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
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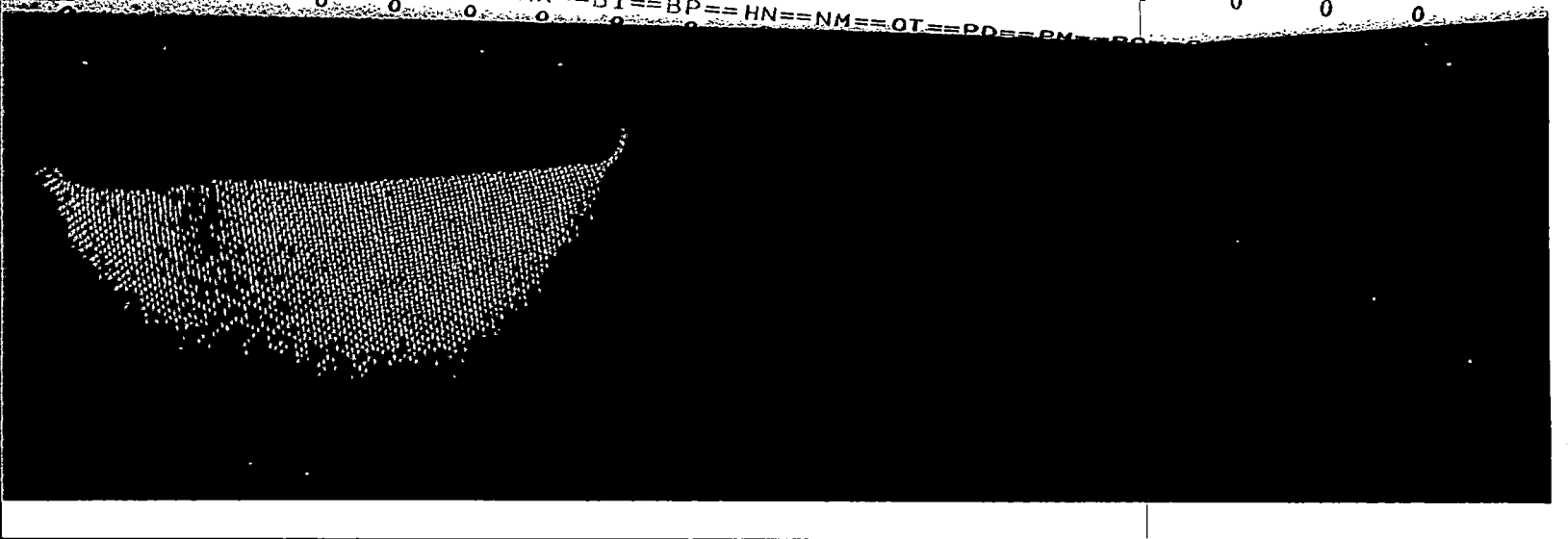


Mike
=KALDI ⊜ /MD

Leslee Farrin

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	1	1	0	0	0	0	0	0	0	0	0
APR	2	1	0	0	1	0	0	0	0	0	1
MAY	2	2	0	0	0	0	0	0	0	0	0
JUN	1	0	1	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	1	1	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	7	5	1	0	1	0	0	0	0	0	1

PRG	OTH==	==AM	==AR	==BI	==BP	==HN	==NM	==OT	==PD	==PM	==PO	==SA	==SC	==SK=
	0	0	0	0	2	0	0	0	0	0	0	0	5	0

Susan
=KELLY ≠ OT

MDA

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	0	0	0	0	0	0	0	0	0	0	0

PRG	OTH==	==AM	==AR	==BI	==BP	==HN	==NM	==OT	==PD	==PM	==PO	==SA	==SC	==SK=
	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Marguerite

BTGH

Marguerite
=MUELLER/MD

BTGH

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	2	2	0	0	0	0	0	0	0	0	0
OCT	1	1	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	3	3	0	0	0	0	0	0	0	0	0

PRG	OTH==	==AM	==AR	==BI	==BP	==HN	==NM	==OT	==PD	==PM	==PO	==SA	==SC	==SK=
	0	0	0	0	0	0	0	0	2	0	0	0	1	0

Edward
=MURPHY/MD

6550 Fannin

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	1	0	0	0	1	0	0	0	1	0	0
APR	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	1	1	0	0	0	0	0	0	0	0	0
NOV	1	0	1	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	3	1	1	0	1	0	0	0	1	0	0

PRG	OTH==	==AM	==AR	==BI	==BP	==HN	==NM	==OT	==PD	==PM	==PO	==SA	==SC	==SK=
	0	0	0	0	0	0	0	0	0	0	0	0	2	1

MAR	0	0	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0	0	0

Ray
=NARAYan/MD

6560 Farmer

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	1	1	0	0	0	0	0	0	0	0	0
MAR	2	0	0	0	2	0	0	0	1	0	1
APR	0	0	0	0	0	0	0	0	0	0	0
MAY	1	1	0	0	0	0	0	0	0	0	0
JUN	4	2	1	0	1	0	0	0	0	0	1
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	1	1	0	0	0	0	0	0	0	0	0
SEP	1	0	1	0	0	0	0	0	0	0	0
OCT	1	0	1	0	0	0	0	0	0	0	0
NOV	1	0	1	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	12	5	4	0	3	0	0	0	1	0	2

PRG	OTH	AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
	0	0	0	0	9	0	0	0	0	0	0	0	3	0

=POST. polio support group

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	0	0	0	0	0	0	0	0	0	0	0

PRG	OTH	AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Mary Helen
=PRITCHETT/SW

BTGH

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	2	1	0	0	1	0	0	0	1	0	0
APR	1	0	0	0	1	0	0	0	1	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	3	2	0	0	1	0	0	0	1	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	1	0	0	0	1	0	0	0	1	0	0
NOV	1	0	1	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	8	3	1	0	4	0	0	0	4	0	0

PRG	OTH	AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
	0	0	2	0	5	0	0	0	0	0	0	0	1	0

?

=SMITH=

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0
APR	1	0	0	0	1	0	0	0	0	0	1
MAY	0	0	0	0	0	0	0	0	0	0	0
JUN	0	0	0	0	0	0	0	0	0	0	0
JUL	1	0	1	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	2	0	1	0	1	0	0	0	0	0	1

PRG	OTH	AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
	0	0	0	0	1	0	0	0	0	0	0	0	0	1

Style
=SOLIS/MD

6621 Farren

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0
MAY	0	0	0	0	0	0	0	0	0	0	0
JUN	2	1	0	0	1	0	0	0	1	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	2	1	0	0	1	0	0	0	1	0	0

PRG	OTH	AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
	0	0	0	0	0	0	0	0	2	0	0	0	0	0

Cindy
=WALKER/SW

Herrmann

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	1	1	0	0	0	0	0	0	0	0	0
MAR	3	2	0	0	1	0	0	0	0	0	1
APR	1	1	0	0	0	0	0	0	0	0	0
MAY	2	2	0	0	0	0	0	0	0	0	0
JUN	1	1	0	0	0	0	0	0	0	0	0
JUL	0	0	0	0	0	0	0	0	0	0	0
AUG	4	3	0	0	1	0	0	0	0	0	1
SEP	2	1	0	0	1	0	0	0	0	0	1
OCT	1	1	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	0	0	0	0	0	0	0	0	0	0	0
TOT	15	12	0	0	3	0	0	0	0	0	3

PRG	OTH	AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
	0	0	1	0	4	0	0	0	1	0	0	0	9	0

Barbara Hermann
=WILLIAMS/SW

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
	0										
JAN	0	0	0	0	0	0	0	0	0	0	0
FEB	0	0	0	0	0	0	0	0	0	0	0
MAR	0	0	0	0	0	0	0	0	0	0	0
APR	0	0	0	0	0	0	0	0	0	0	0
MAY	1	0	0	0	1	0	0	0	0	1	0
JUN	0	0	0	0	0	0	0	0	0	0	0
JUL	1	1	0	0	0	0	0	0	0	0	0
AUG	0	0	0	0	0	0	0	0	0	0	0
SEP	0	0	0	0	0	0	0	0	0	0	0
OCT	0	0	0	0	0	0	0	0	0	0	0
NOV	0	0	0	0	0	0	0	0	0	0	0
DEC	2	1	0	0	1	0	0	1	0	0	0
TOT	4	2	0	0	2	0	0	1	0	1	0

PRG	OTH		AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1

MTH	TOT	IP	OP	PE	CL	OTH	DE	IN	FN	HO	RO
YTD	413	176	91	3	143	0	4	25	51	16	47

PRG	OTH		AM	AR	BI	BP	HN	NM	OT	PD	PM	PO	SA	SC	SK
	0	0	21	2	162	0	0	3	0	51	3	0	0	139	32

PHONE CALL

FOR _____ DATE 3/21/91 TIME _____ A.M. P.M.

M 1984 Estimated population

OF for U.S.

PHONE _____
AREA CODE NUMBER EXTENSION

MESSAGE 237,001,000

SIGNED

- PHONED
- RETURNED YOUR CALL
- PLEASE CALL
- WILL CALL AGAIN
- CAME TO SEE YOU
- WANTS TO SEE YOU

TOPS FORM 4003

5/100,000

Incidence

Evyas '85

50/million

11 K
8/

NY Public Health '80

(TX TCR '83)

Harris Co. 60/mil

Galveston 80/mil

urban rates higher

Prevelance

1000 / million

23 K

Fla. + Va. rates

30 - 40 / mil

gradual decline

11) 237,000

237,000) 11,000

$$\frac{11}{237{,}000} = \frac{x}{100{,}000}$$

5

237) 1,100,000

1,185

~~TRR~~ mission

– 5 Y

etc.

* A look @ old plan

Overview of prev

of 5Y / 3Y

* TRR statistic

Galvin pp 3-4

---

* Call library - get

current pop.

in 713 & 409

area codes and

U.S. population in '84

Hon - Gal - Brady

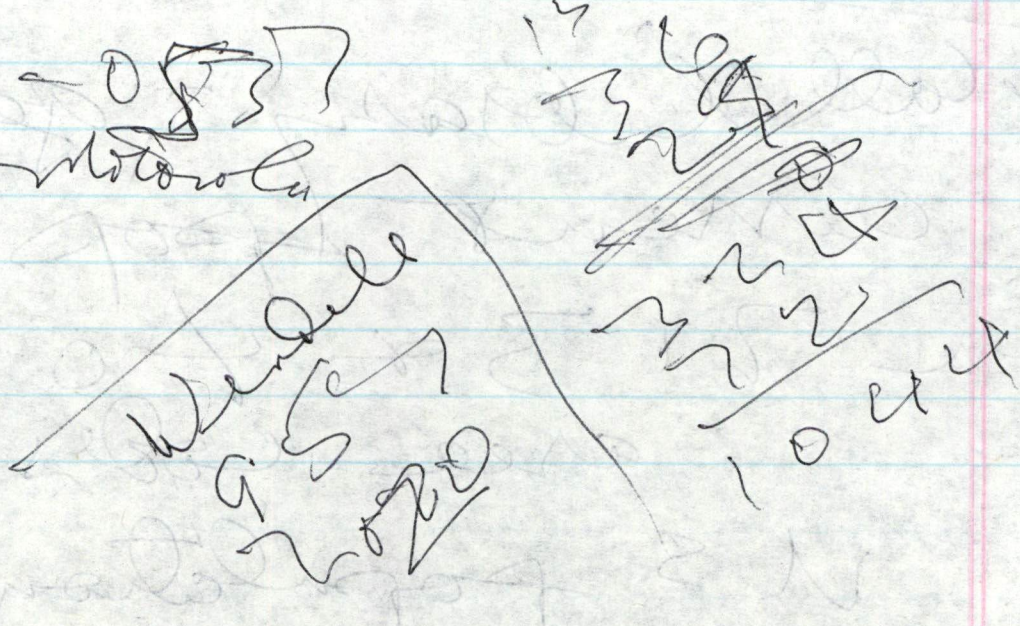
58

3,608,700

U.S. 84

490 - 0837

Bill - Motorola



head injury

incidence

29/100,000

survive moderate to severe

25/100,000 all

20 fatal

135 seek care

85 hospitalized

Prevalence

The Institute for Rehabilitation and Research

BRAIN INJURY STATISTICS

Facts about Death, Disability and Costs Resulting from Traumatic Brain Injury in Comparison with other Injuries and Diseases

Part 1: Statistics for USA and Texas

Part 2: Statistics for TBI Model System at TIRR

Compiled by

L. Don Lehmkuhl, Ph.D., and Staff

of the

TBI Model System Research Program

The Institute for Rehabilitation and Research (TIRR)

1333 Moursund Avenue

Houston, Texas 77030

713-797-5713

July, 1990

The Texas Medical Center
1333 Moursund
Houston, Texas 77030-3405
Telephone: (713) 799-5000
Toll-Free: (800) 44REHAB
Telefax: (713) 799-7095

MORTALITY RATES AND ESTIMATED YEARS OF POTENTIAL LIFE LOST BY CAUSE OF DEATH, 1988

CAUSE OF DEATH	PER 100,000 PERSONS	YPLL-65*
All Causes	883.0	12,281,741
Heart Disease	312.2	1,466,629
Cancer	198.6	1,809,289
Stroke	61.1	245,722
Unintentional Injuries	37.7	2,319,400
Chronic Obstructive Pulmonary Disease	33.3	128,126
Pneumonia/Influenza	31.5	172,712
Suicide/Homicide	21.3	1,361,473
Diabetes Mellitus	16.1	130,666
Chronic Liver Disease	10.6	236,944
Aids	6.6	472,800

* Years of Potential Life Lost before Age 65

TIRR Brain Injury Research

Source: MMWR 39:21, 1990

INJURY STATISTICS BY CLASS OF INJURY, 1985
(Per 100,000 persons)

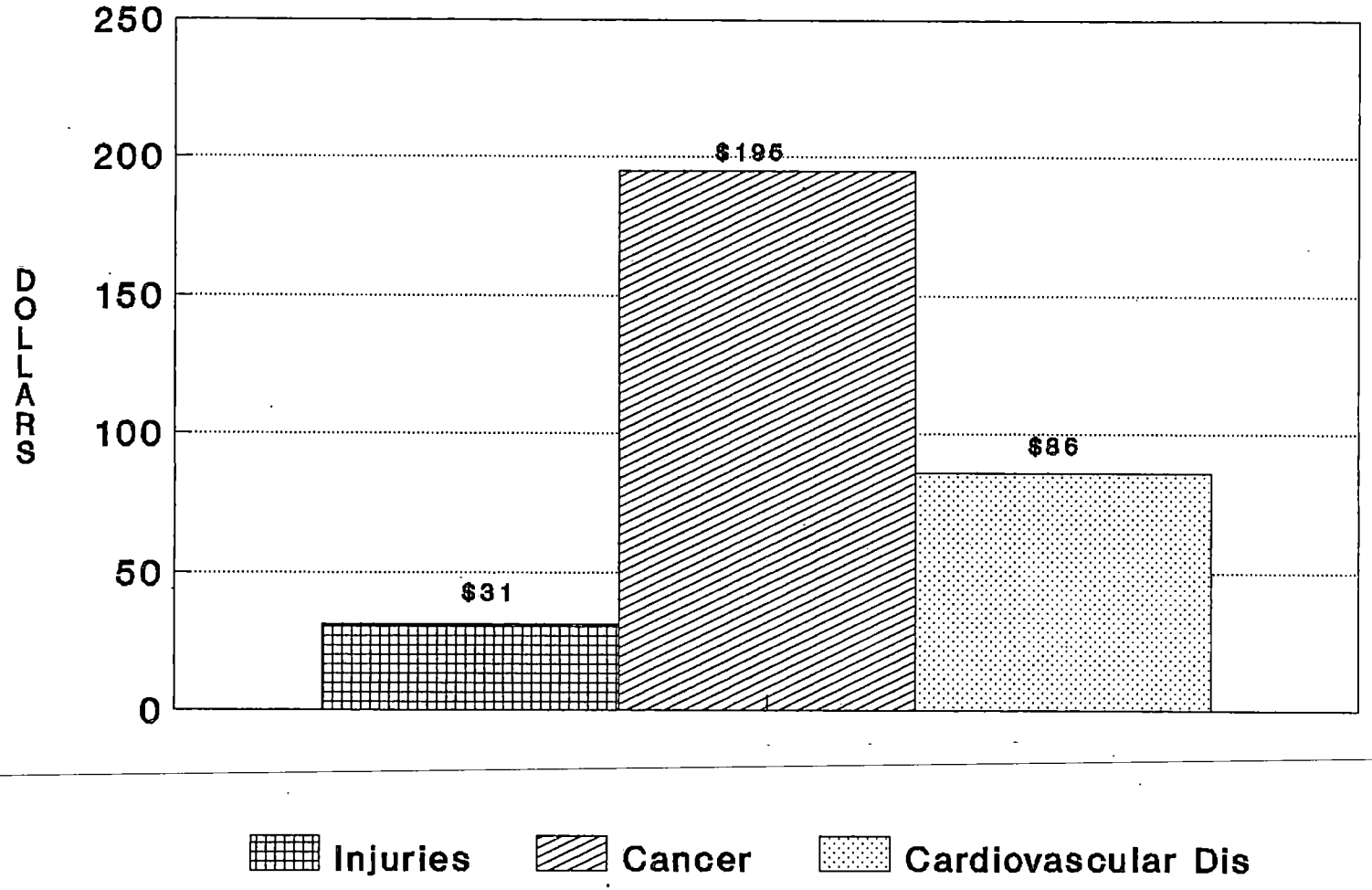
CLASS	TOTAL	FATALITIES	HOSPITALIZED	NON-HOSPITALIZED
MOTOR VEHICLES	2,266	19	221	2,026
FALLS	5,184	5	331	4,848
FIREARMS	113	13	28	72
POISONINGS	718	5	92	621
FIRE/BURNS	617	2	23	592
DROWNINGS/NEAR DROWNINGS	16	3	2	11
OTHER	15,071	12	294	14,765

TIRR Brain Injury Research

Source: Cost of Injury In U.S., 1989, pp. 208-214

9-injury1-bbo

RESEARCH EXPENDITURES PER LIFE YEAR LOST



TIRR Brain Injury Research

8-injury4-8cc

Source: Cost of Injury In U.S.,1989,p.69

RATES OF DEATH AND DISABLEMENT FROM UNINTENTIONAL INJURIES, 1988
(Per 100,000 Persons)

CLASS	DEATHS	DISABLEMENT
Motor Vehicle Accident	19.9	731
Home	9.2	1,380
Public, nonwork	7.3	934
Work	4.3	731
All Classes	39.1	3,696

TIRR Brain Injury Research
e-injury81-ooo

Source: NSC Accident Facts, 1989, p.2

ACCIDENTAL DEATHS PER 100,000 PERSONS BY STATE IN RSA REGION VI, 1988

STATE	TOTAL	MVA	WORK	HOME	PUBLIC NON-MVA	UNCLASSIFIED
ARKANSAS	44.8	23.1	---	---	1.2	20.5
LOUISIANA	45.1	---	---	---	---	---
NEW MEXICO	64.2	35.3	1.6	10.3	16.4	0.6
OKLAHOMA	38.1	18.0	1.3	12.5	5.9	0.3
TEXAS	36.4	19.4	1.5	6.1	9.4	0.1
UNITED STATES	39.1	19.9	4.3	9.2	7.3	---

Source: NSC Accident Facts, 1989, p. 28

OCCUPANT FATALITY RATE BY VEHICLE TYPE, 1986

VEHICLE TYPE	FATALITIES PER HUNDRED MILLION VEHICLE MILES TRAVELED
MOTORCYCLE	48.4
PASSENGER CAR	1.9
SCHOOL BUS	0.5

TIRR Brain Injury Research

g-injury12-bvc

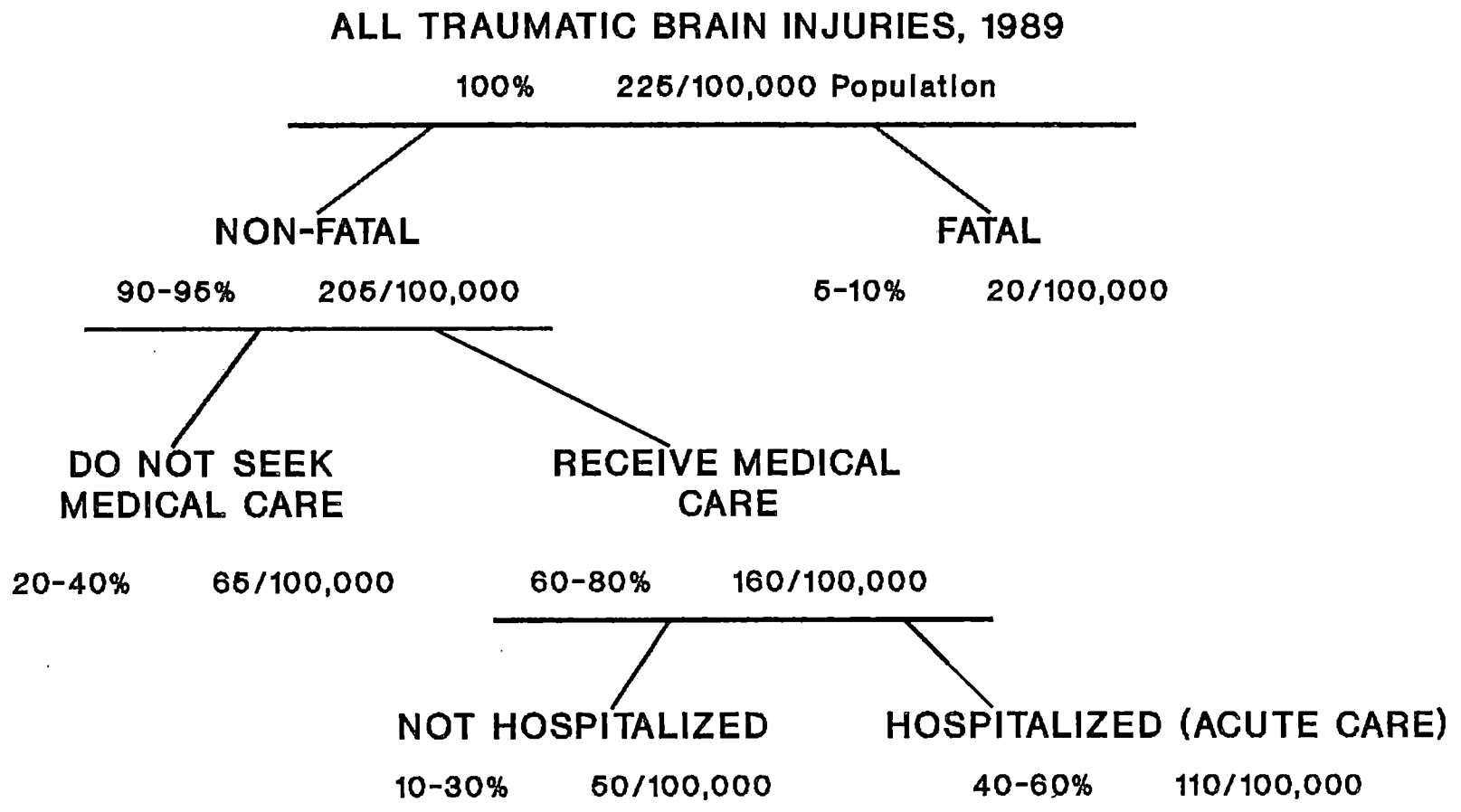
Sources: NHTSA Fatal Accidents Reporting Systems, 1986,p.8
USDT Highway Statistics, 1987, p. 177

COMPARATIVE INCIDENCE OF TRAUMATIC BRAIN INJURY AND OTHER MEDICAL CONDITIONS, 1989

MEDICAL CONDITION	PER 100,000 PERSONS*	NEW CASES PER YEAR	
		USA	TEXAS
TBI (Moderate & Severe)	29**	71,920	4,930
PARKINSON'S	16	39,680	2,720
AIDS	14 +	34,720	2,415
PRIMARY SEIZURES	13	32,240	2,210
CEREBRAL PALSY	9	22,320	1,530
PRIMARY BRAIN TUMOR	9	22,320	1,530
SPINAL CORD INJURY	3	7,440	510
MULTIPLE SCLEROSIS	3	7,440	510
MUSCULAR DYSTROPHY	1.2	2,975	204

USA population, 1989 = 248,000,000
TEXAS population, 1989 = 17,000,000

Sources: * Neurology 32:1207, 1982
** Amer. J. Epidem 119:186, 1984
+ MMWR 38:892, 1990



Source: CNS Status Report, 1985, pp. 36-41

CATEGORIES DEFINING TRAUMATIC BRAIN INJURY SEVERITY

A. TRIVIAL* injury to the head without Loss of Consciousness (LOC) or Post-Traumatic Amnesia (PTA), with no skull fracture, cerebral contusion, laceration, or intracranial hematoma.

B. MILD** injury to the brain produces physiological disruption of cerebral function, as manifested by at least one of following:

1. Any period of LOC;
2. Any loss of memory for events immediately before or after the accident (retrograde or anterograde amnesia);
3. Any alteration in mental state at the time of the accident (e.g. feeling dazed, disoriented, or confused), even in the absence of LOC or amnesia;
4. Physical symptoms which are potentially brain related (e.g. nausea, vomiting, dizziness, headache, tinnitus, blurred vision, other sensory loss such as taste or smell, or extended periods of fatigue and lethargy);
5. Development of post-traumatic cognitive deficits (e.g. attention, concentration, language, memory, perception, etc.), which cannot be completely accounted for by emotional state;

but where the severity of the injury does not exceed the following:

a. LOC of approximately 30 minutes or less;
b. After 30 minutes, an initial Glasgow Coma Scale score of 13-15;
c. PTA not greater than 24 hours.

Also called "MINOR" Traumatic Brain Injury

C. MODERATE * injury where LOC and/or PTA occurred for more than 30 minutes but less than 24 hours, and/or presence of a skull fracture. An initial Glasgow Coma Scale score of 9-12.

D. SEVERE * injury where LOC and/or PTA occurred for more than 24 hours, or a cerebral contusion, laceration or intracranial hematoma was present. An initial Glasgow Coma Scale score of 3-8.

E. FATAL injury.

TIRR Brain Injury Research

9-TBIDEF-SEC

Sources: * Neurol. 30:912, 1980
** ACRM ISIG-HI Subcommittee on Mild TBI, 1990

INCIDENCE OF TRAUMATIC BRAIN INJURY BY SEVERITY OF DAMAGE, 1989

SEVERITY RATING	PER 100,000 PERSONS	ESTIMATED NUMBER/YEAR	
		USA	TEXAS
MILD	131	324,880	22,270
MODERATE	15	37,200	2,550
SEVERE	14	34,720	2,380
TOTAL	160	396,800	27,200

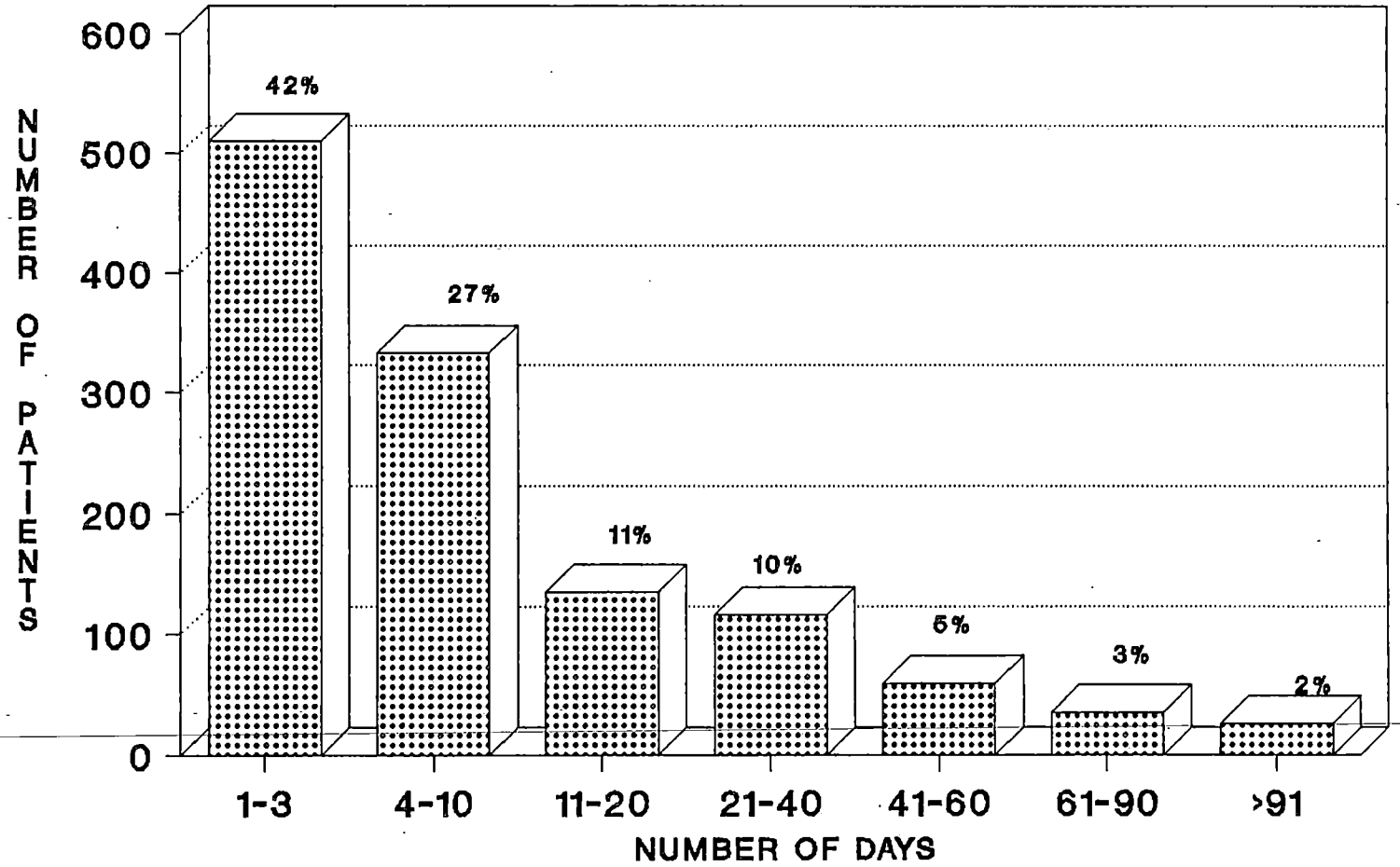
USA population, 1989 = 248,000,000
TEXAS population, 1989 = 17,000,000

TIRR Brain Injury Research

g-injury16-6ec

Source: Amer. J. Epidem 119:186, 1984

LENGTH OF STAY IN TRAUMA CENTER
N = 1,214



TIRR Brain Injury Research

9-injury16-Dec

Source: J. Trauma 29:662, 1989

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Kraus JF, Black MA, Hessol N, Ley P, Rokaw W, Sullivan C, Bowers S, Knowlton S and Marshall L. The incidence of acute brain injury and serious impairment in a defined population. American Journal of Epidemiology 119(2):186-201, 1984.

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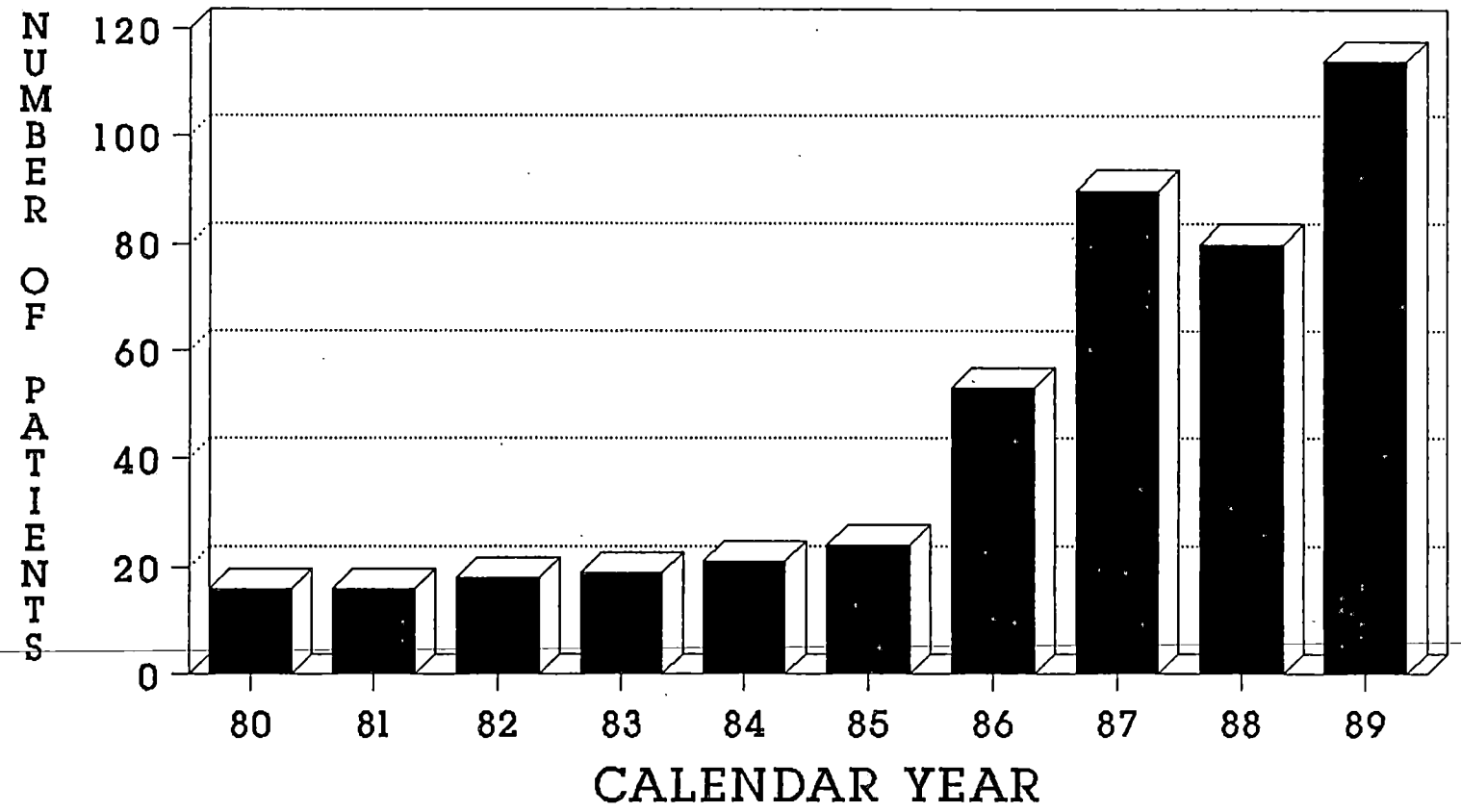
PART 2

STATISTICS FOR THE TBI MODEL SYSTEM AT THE INSTITUTE FOR REHABILITATION AND RESEARCH (TIRR)

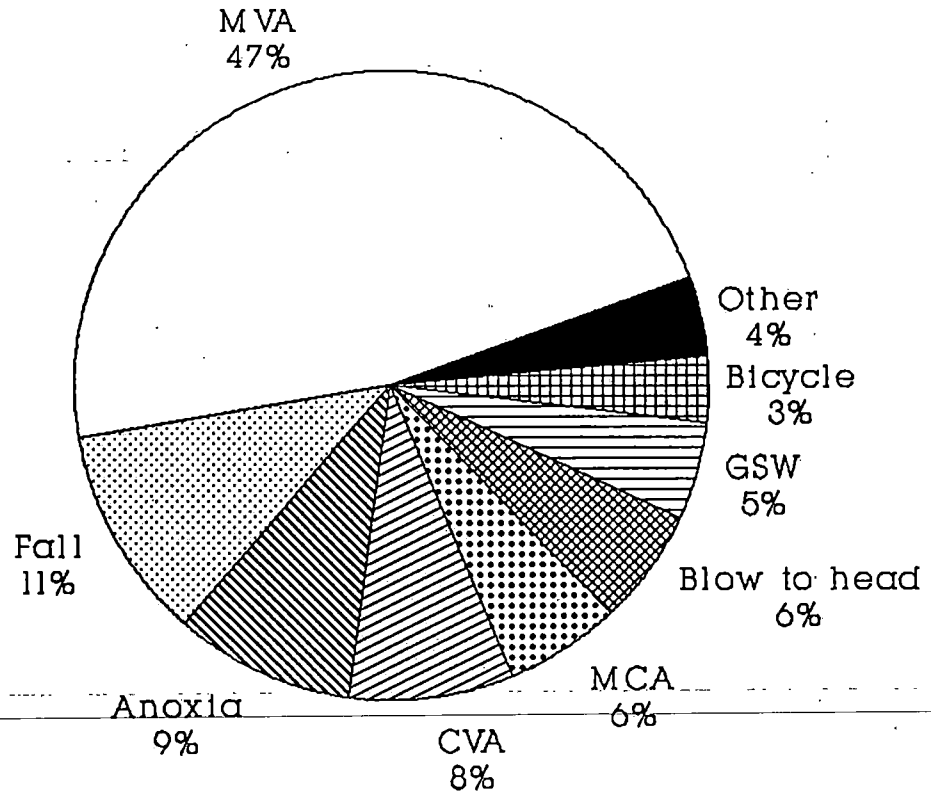
Brain Injury Program
Historical Perspective



TIRR Brain Injury Research

Source: TBI Model Systems Database

Causes of Injury
Acute Rehab Hospital, 1989 Admissions

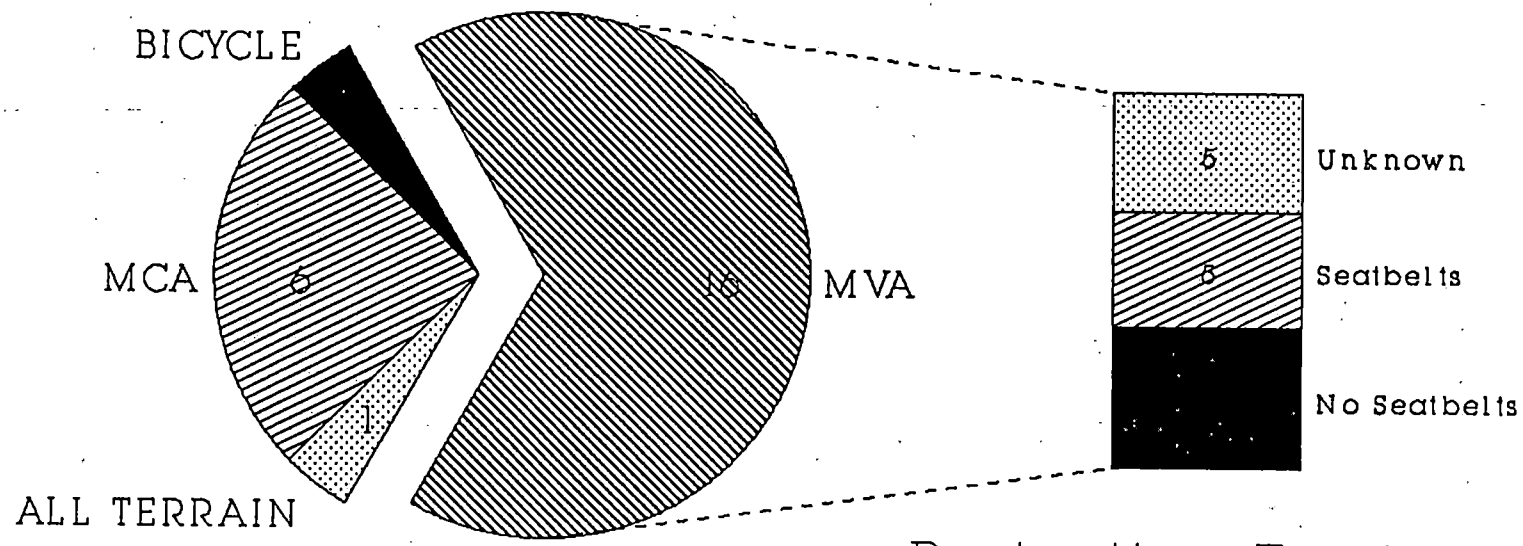


Total = 114 patients

TIRR Brain Injury Research

Source: TBI Model Systems Database

Head Injury Program 1989



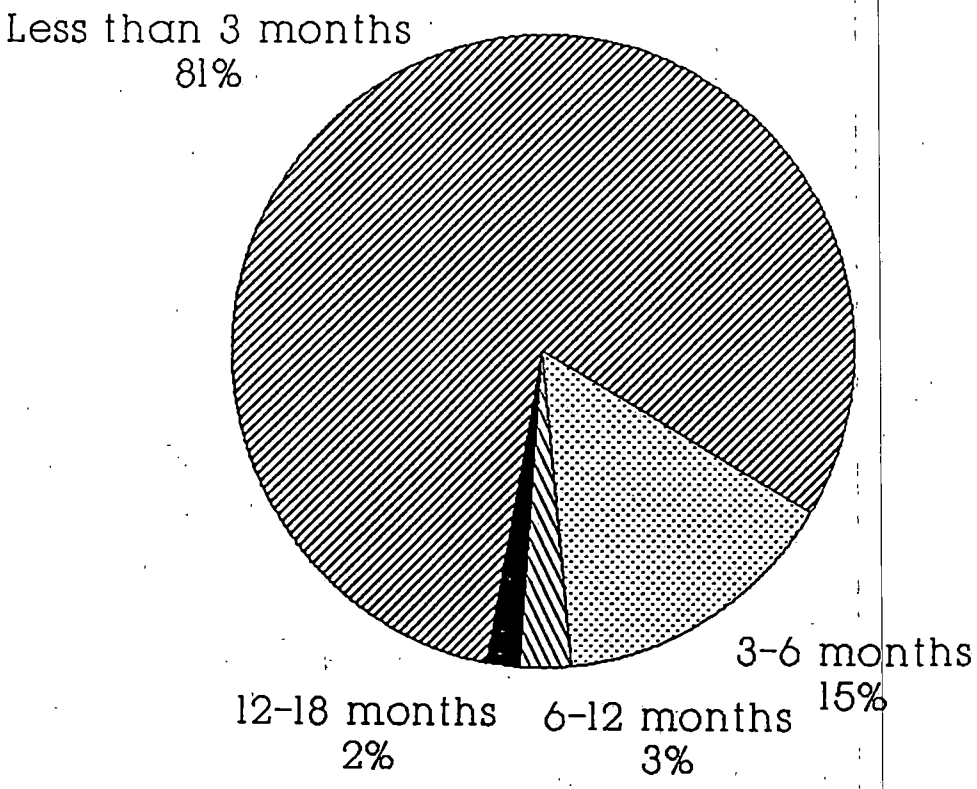
Vehicular Cause of TBI

Protective Devices Used

Helmet Use: 0/8 patients

Source: TBI Model Systems Database

LENGTH OF STAY
ACUTE REHABILITATION, 1989 ADMISSIONS



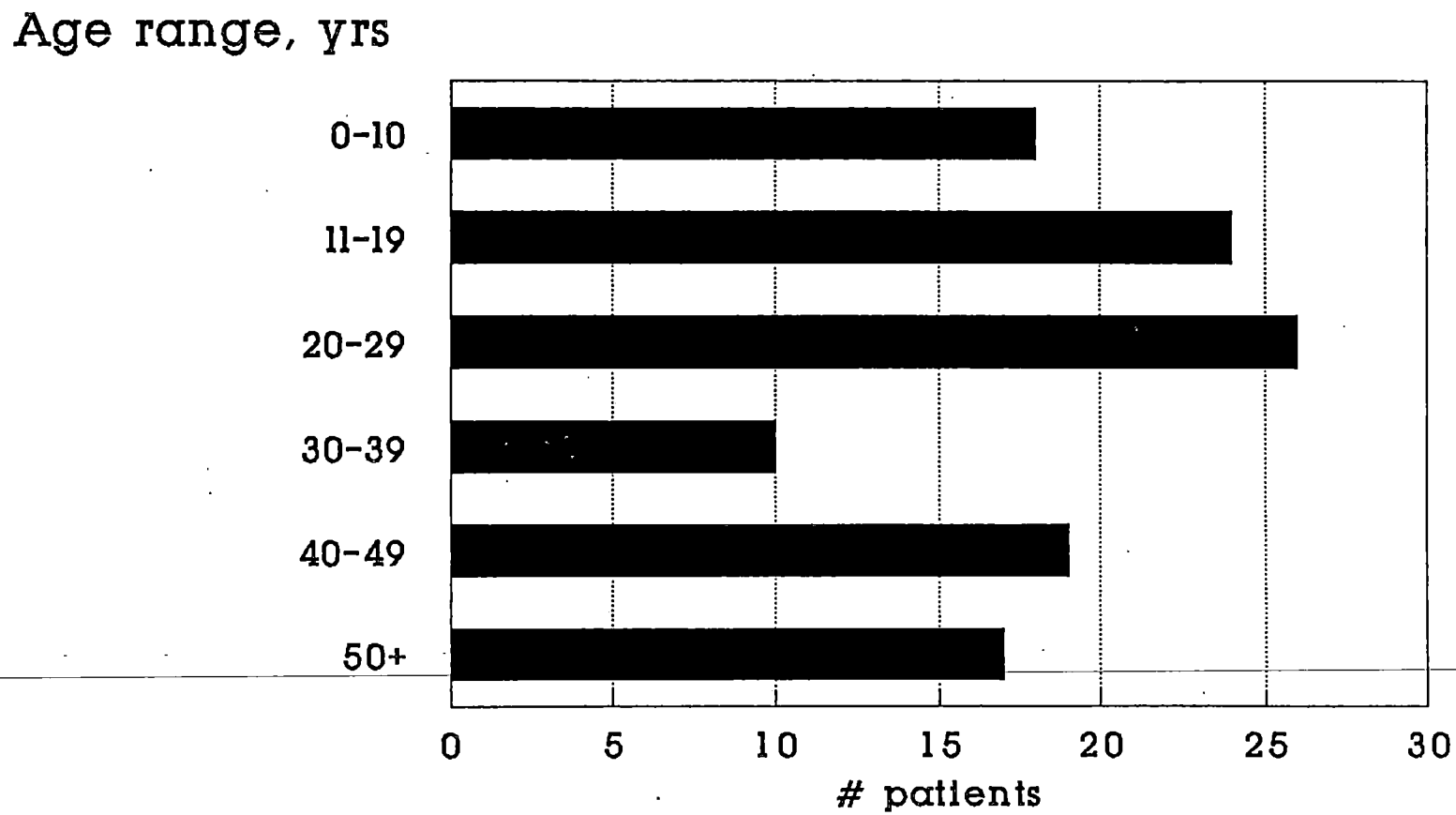
Total = 114 patients

TIRR Brain Injury Research

Source: TBI Model Systems Database

AGE AT INJURY

Patients in Acute Rehabilitation, 1989



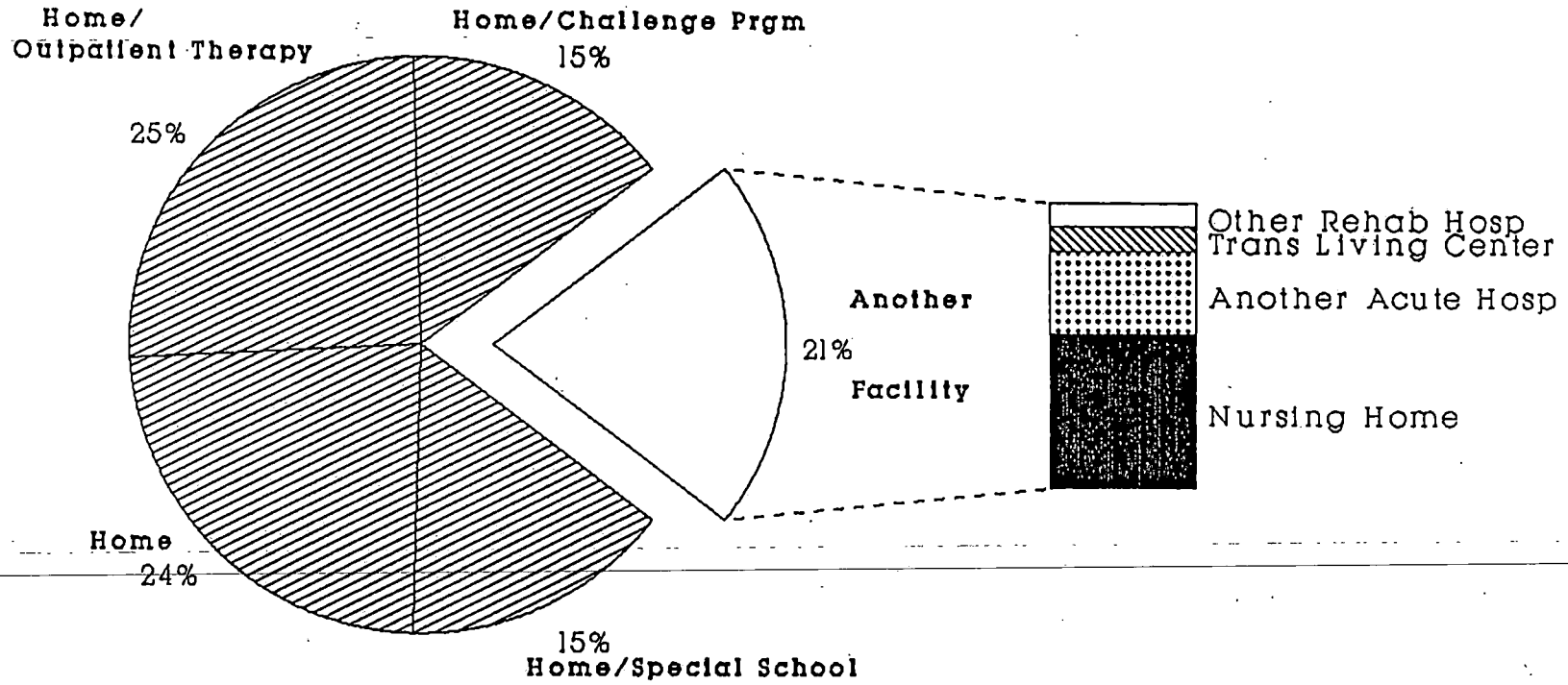
Total = 114 pts

Source: TBI Model Systems Database

TIRR Brain Injury Research

DISCHARGE DESTINATION

Acute Rehab Hospital, 1989 Admissions



Source: TBI Model Systems Database

CENTRAL NERVOUS SYSTEM TRAUMA
Volume 2, Number 1, 1985
Mary Ann Liebert, Inc., Publishers

Spinal Cord Injury in the United States: A Statistical Update

ZAKI ERGAS

ABSTRACT

Major sources of data on incidence and prevalence of spinal cord injury (SCI) in the United States were reviewed, including many federal government agencies, state level rehabilitation and health departments, regional SCI systems, private voluntary organizations, available literature, and several unpublished studies. With the exception of the Veterans Administration, many of the federal databases did not prove helpful. For example, the estimates of the annual surveys conducted by the National Center for Health Statistics (NCHS) of traumatic SCI are likely to be inflated due to multiple hospital admissions of the same patient and deflated due to misclassification of SCI. The tendency for inflation and deflation, however, may balance each other, resulting in a rough estimate of annual traumatic SCI incidence of about 11,000 for 1984. Data from the Florida and Virginia Central Registries of SCI suggest a decrease in traumatic SCI incidence in recent years. Based on data abstracted from a regional study, the California Disability Survey, we estimate the prevalence of traumatic SCI to be about 238,000 in the United States for 1984.

Key Words: Spinal cord injury–SCI statistics–SCI in the USA–SCI prevalence–SCI systems–SCI central registries–SCI federal agencies.

INTRODUCTION

WE SOUGHT TO INVESTIGATE every legitimate source of spinal cord injury (SCI) statistics—federal and state agencies, regional SCI centers, published and unpublished literature—in the hope of obtaining reliable statistics on SCI incidence and prevalence in the United States. Although our study does not provide definitive answers to the questions raised, it does cover new ground in two respects: (1) it produces new estimates based on recent data, and (2) by clearly showing the difficulties involved in acquiring and evaluating SCI statistics, it argues strongly for the establishment of a national SCI registry.

Data from many federal agencies were reviewed. The National Center for Health Statistics (NCHS) conducts two major annual surveys—the National Health Interview Survey (NHIS) and the National Hospital Discharge Survey (NHDS). Other relevant agencies that compile data on SCI

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include the National Institute of Handicapped Research (NIHR), run by the Rehabilitation Services Administration (RSA), the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS), which is part of the National Institutes of Health (NIH), the National Highway Traffic Safety Administration (NHTSA), the Office of Research, Statistics and International Policy (ORSIP) and the Division of Disability Studies, both part of the Social Security Administration (SSA), and the SCI service of the Veterans Administration (VA).

At the state level, we communicated with rehabilitation and health departments and regional model SCI systems. We examined several private voluntary organizations, such as Easter Seal, Courage Center, and the California Independent Living Centers Association. Finally, we reviewed the literature for perspective and, in some cases, specific data that were used in support of estimates generated from other sources.

SCI is statistically described in terms of incidence and prevalence. Incidence is the number of new cases occurring in a given year and geographic entity per million population. Prevalence is the total number of cases in a given population for a given year and geographic entity. The paucity of definitive or reliable statistics on SCI in the United States makes SCI incidence difficult to estimate. Currently, only 2 states, Florida and Virginia, have registries to which all traumatic cases must be reported within a matter of days. The situation is even worse for estimating prevalence. Population-based sureys have not been undertaken at the national level until recently. Because traumatic SCI is a relatively low-incidence condition, large samples have to be surveyed, and such surveys are both financially prohibitive and technically difficult.

PREVALENCE

Kurtzke[1] was one of the first researchers to use NHIS data systematically to derive estimates of SCI prevalence. His analysis of the 1971 data suggests that the number of cases of "total complete paralysis due to injury" is between 17,000 and 41,000 persons (32,000 quadriplegics and 9,000 paraplegics.[1] His upper estimate of 41,000 appears to underestimate the problem, even for 1971.

We found only one population-based regional survey of prevalence that had a large enough sample to encourage our confidence in its conclusions. The California Disability Survey (CDS) was conducted by the Survey Research Center of the University of California at Berkeley.[2] Since the results of this survey have not, to our knowledge, been published and since we will use the data as a basis for estimating prevalence, we will describe some of the findings in detail.

The CDS used a computer-assisted telephone system to make 200,000 randomly selected telephone calls. Of these calls, 67,000 numbers were reached, and usable interviews were completed in 30,791 households containing 86,113 persons, of whom 57,223 were identified as working age adults. More than 10% of the latter, i.e., 5826 adults, reported a disability. Further questioning of this cohort indicated that 2.2%, or 130 individuals, suffered from "paralysis with spinal cord injury." There were 7,700,750 households in California in 1978, when this survey was conducted. The CDS sample of 30,791 is 1/250 of that number. Thus, the study estimated 32,500 persons with SCI in the working age population of the state of California.

A number of caveats must be made about this study. First, the estimate of 32,500 SCI persons includes traumatic as well as other causes of SCI. About two thirds of SCI has been estimated to be caused by trauma. For example, Guttman[3] reports that of 3000 cases catalogued at Stoke-Mandeville Hospital after World War II, 1963, or 65.4%, were traumatic in origin. Minaire et al.[4] also found that 848, or 68.72%, of 1234 SCI patients surveyed in the Rhone-Alpes Region of France were traumatically injured. Incidentally, only 67.7% of the 130 persons interviewed described SCI with paralysis as their primary disability. The remainder listed SCI as a secondary condition. Second, conditions were self-reported and therefore likely to be less reliable than medical diagnosis. For example, transient paresis may have been included. Third, the sampling error is unknown, although the large number of calls made would tend to reduce the magnitude of any bias. The 30,791 completed interviews far outnumber those in other studies, e.g., the SSA's massive 1978 study[5] based on 9859 interviews.

INCIDENCE

To estimate SCI incidence, many investigators rely on HDS data provided by the NCHS, which uses the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) Diagnostic Code to classify patients who are admitted and discharged from short-stay hospitals (Table 1). The 2 codes for SCI are 806 (fracture of vertebral column with SCI) and 952 (SCI without evidence of spinal bone injury).[6]

TABLE 1. NATIONAL HOSPITAL DISCHARGE SURVEY. FIRST-LISTED DIAGNOSES FROM SHORT-STAY NONFEDERAL HOSPITALS

ICD-9-CM Code[a]	*1979*	*1980*	*1981*	*1982*
806	2,000	4,000[b]	6,000	3,000[b]
952	13,000	10,000	12,000	9,000
TOTAL	15,000	14,000	18,000	12,000

[a]Incidence of ICD-9-CM codes 806 and 952 listed as first diagnosis.
[b]Does not meet NCHS Standards of Reliability—relative standard of error (RSE) more than 30%.

Again, a number of caveats seriously impair the usefulness of these estimates.

1. The most critical shortcoming of these estimates is that they do not account for multiple hospital admissions of the same patient, whether in the same hospital or in different hospitals. An unknown but probably large proportion of SCI patients may be cared for in more than one hospital, e.g., in emergency rooms, facilities close to the accident, designated spinal injury centers, and rehabilitation institutes. DeVivo[7] notes that according to their NSCIDRC data bank, only 8.5% of traumatic SCI patients were admitted directly to an SCI care system, whereas 61.7% were first admitted to another hospital, 26% were admitted to 2 presystem hospitals, 3.3% were admitted to 3, and 0.4% were admitted to 4 or more presystem hospitals. These statistics, based on more than 5000 cases, suggest that multiple admissions result in an overrepresentation of case incidence of about 100%. The NCHS/NHDS estimates of incidence would then have to be halved from about 15,000 to about 7500.

2. This overestimation, however, appears to be counterbalanced to a significant degree by a relatively large number of cases potentially classified under ICD-9-CM 806 and 952s that are misclassified in other codes. Kraus et al.,[8] in their survey of traumatic SCI incidence in California, found that about half of their patients were classified under codes other than 806 and 952, that is, under codes 349, 725, 772, 839, 953, and 03. The same point was made by Webb et al.,[9] who concluded that "If one uses only specific ICDA codes for acute SCI retrospectively in identifying SCI patients, one will significantly underestimate the number of cases." Webb et al. found the underestimation in question to be about 23%. If we assume the average of the ratios of underestimation by Kraus et al. and Webb et al. the NCHS/NHDS estimate of 7500 should be increased to about 10,000.

3. Another source of serious underrepresentation by the NCHS/NHDS is that the SCI totals of ICD-9-CM 806 and 952s include only first-listed diagnoses. A significant number of SCI cases may be recorded as second, third, fourth, and even fifth diagnoses,[10] perhaps in the range of 20 to 30%, which brings our average NCHS/NHDS estimate to 12,000–13,000.

4. Finally, the NCHS/NHDS data are inflated because in the past a certain amount of SCI caused by such diseases as syringomyelia, amyotrophic lateral sclerosis, tumors, and abscesses and SCI as a secondary condition after strokes and osteoarthritic conditions have been misclassified un-

der ICD-9-CM 806 and 952 (which are specific codes for traumatic SCI). For example, Bracken et al.[10] found that 12.2% of their cases were in reality disease caused. This suggests an inflation of the NCHS/NHDS estimates by 10–15%, which reduces our estimate to about 11,000 to 12,000.

Three major studies of SCI incidence

Three major population-based SCI incidence surveys were undertaken in the last 15 years.[8,10,11] Kraus et al.'s study is a medium-size regional survey that used an impeccable methodology for case ascertainment. Its catchment area was 18 northern California counties with a total population of 5.8 million. The study, which found an incidence rate of 32.2 per million (excluding deaths-on-arrival) in 1971–1972 is still widely cited. In another well-regarded study, Bracken et al.[10] found a national incidence rate of 40.1 per million for the 8-year period from 1970 to 1977.

NINCDS's National Head and Spinal Cord Injury Survey (NHSCIS)[11] found a national SCI incidence rate of 50 per million for 1974. However, there are serious problems with the NHSCIS: (1) It does not deal with the important issue of multiple hospital admissions, (2) its joint sample for head injury and SCI is made up by 1236 cases of the former and only 31 cases of the latter—as a result, the study's conclusions on SCI are based on a very small sample with unacceptably high RSE levels, (3) there is the mystifying finding that there are more female (60%) than male cases of traumatic SCI, and (4) such codes as 344, 725, 772, and 93 were not investigated.[11]

Bracken et al.[10] pointed out that their results correlate well with those of Kraus et al.[8] and the NHSCIS.[11] The figure, 31.4 per million in 1971–1972, is very similar to the 32.2 million of Kraus et al., and 47.6 per million in 1974 is comparable to that of NHSCIS's 50 per million. The similarity between the Bracken et al. and NHSCIS results is surprising because the former researchers did account for multiple hospital admissions and the latter did not. Bracken et al. explained this anomaly by pointing out that for a certain number of cases the second admission for a person with SCI may be at a long-stay rehabilitation hospital, which is not included in the HDS counts by the NCHS.[12]

The fact that they correlate well tends to reinforce the credibility of all 3 studies, but especially that of Bracken et al., with an average rate of 40.1 per million for 1970–1977. Note that the incidence of SCI in the United States appears to peak in 1974, with 47.6 per million, and to decline thereafter gradually and moderately to 42.8 per million in 1977. However, the incidence for the age group 20–24 years increased dramatically from 43.3 per million in 1972 to 104.9 per million in 1977. A little less markedly, the incidence rate in the age group 25–34 also soared from 37.9 per million in 1972 to 83.2 per million in 1977.

More regional estimates

In 1973, the RSA initiated a national program of Regional Model SCI Systems whose administration was entrusted to the NIHR. The program grew over the years into a network of 17 centers strategically located to cover most of the continental United States, and the NSCIRDC based at the Good Samaritan Hospital in Phoenix, Arizona, was established. Eventually a databank of more than 6000 traumatic cases admitted to the SCI Care Systems of the program was established between 1973 and 1982. The program was discontinued in 1982 by the RSA, but it has since been taken over by the SCI Care System of Birmingham, Alabama.

We hoped that the regional SCI systems would provide reasonably reliable estimates of SCI incidence, but poorly defined catchment areas, unreliable estimates of the percentage of cases that were actually referred to the relevant center, and failure to document the number of first admissions made interpretation of the data difficult. Some centers, for example, those at Rochester and Craig, overcame these problems in their database. Rochester has had an average annual intake of about 50 first admissions in the last 5 or 6 years, its catchment area is relatively well defined with a population of 1.25 million, and its referral ratio is estimated to be "over 90 percent,"[12] suggesting an incidence of between 40 and 45 per million.[13] Officials in the Craig Hospital, probably the biggest SCI center in the country, believe, perhaps justifiably, that all traumatic SCI cases that occur in Colorado are

most likely referred to them. Since the population of the state is about 2.9 million and first admissions in 1980–1981 and 1981–1982 totaled, respectively, 81 and 92 cases, the average incidence in Colorado would be about 30 per million.[14] The Rancho Los Amigos Hospital in southern California, on the other hand, has a more problematical dataset. Officials there noted that in the last 3–4 years, approximately 80% of the first admissions (170–180) have been Los Angeles County residents. This suggests a figure of about 150 patients per year for a catchment area of about 7.5 million population. At a referral rate estimated at about 50%, we can roughly estimate an incidence rate of 40 per million for Los Angeles County between 1980 and 1984.[15]

Central registries

Two states, Florida and Virginia, have central registries to which, by law, all traumatic cases of SCI must be reported (Tables 2 and 3). Usually, most hospitals report within days, but it should be noted that the law does not provide any penalties for nonreporting. Florida officials assume that 100% of the cases are eventually reported. Virginia assumes that 95% are reported. In both Florida and Virginia, statistics seem to point to a decrease of SCI incidence due to trauma in recent years, which appears to be supported by federal data on traffic accidents.

Two special cases

Two regions, Kentucky and two Texas counties, appear to have an unusually high incidence of traumatic SCI. In a 1973 study, the number of new injuries in Kentucky for 1970 was estimated to be between 300 and 400 in a population of about 3.2 million, which is an incidence rate of between 94 and 125 per million.[16] This "inordinately high incidence of spinal injuries in Kentucky," is at-

TABLE 2. SCI INCIDENCE IN FLORIDA. 1980–1984: CENTRAL REGISTRY DATA

Year[a]	*1980–1981*	*1981–1982*	*1982–1983*	*1983–1984*
Number of cases[b]	411	423	416	364
Population[c]	10.18	10.47	10.68	11[d]
Incidence rate per million population	40.3	40.3	38.9	33.1

State of Florida, Department of Health and Rehabilitation Services. Spinal cord injury program, rev. May 1983. Fletcher, W.B., Spinal Cord Injury Program, Department of Health and Rehabilitative Services, State of Florida. (Sept. 13, 1984). Personal communication.

[a]From June 30 to July 1.

[b]In addition, in 1982–1983 and 1983–1984, 140 and 151 cases, respectively, of disease-caused SCI were recorded.

[c]Bureau of Census estimates.

[d]Provisional estimates.

TABLE 3. SCI INCIDENCE IN VIRGINIA. 1979–1984: CENTRAL REGISTRY DATA

Year	*1979*	*1980*	*1981*	*1982*	*1983*
Number of cases	176	190	203	170	164
Population[a]	5.308	5.347	5.436	5.485	5.550[b]
Incidence rate per million population	33.1	35.5	37.3	31.0	29.5

Owens, J., Department of Rehabilitation Services, State of Virginia. (Sept. 24, 1984). Personal communication.

[a]Bureau of Census estimates.

[b]Provisional estimates.

tributed "to the combination of acute alcoholic intoxication, automobiles, and winding mountainous roads of eastern Kentucky."[17] However, more recent data from Kentucky do not appear to support this exceptionally high rate. The admissions pattern of the Cardinal Hill Hospital, whose primary catchment area is eastern Kentucky, with a population of about 2 million, is shown in Table 4. Even if these numbers are "on the conservative side," as Tibbs suggests, they still fall far short of the rates noted in the 1973 study.

According to a recent report, "surveys by the University of Texas School of Public Health estimate the incidence of spinal cord injury in Harris County at 6/100,000, and in Galveston County at 8/100,000 in 1980."[18] These high rates appear to correlate with high death and injury rates due to violence. The Texas Institute for Rehabilitation and Research (TIRR) received 1164 patents from 1959 to 1976. About two thirds of these patients were from Texas. "Gunshot wounds are the third most common cause of spinal cord injuries (162 cases).... In several large metropolitan areas with large inner-city populations, this cause of spinal cord injuries ranks number one, ahead of automobile accidents."[19] This may explain the higher traumatic SCI incidence.

Federal data (other than NCHS)

Social Security Administration (SSA): We evaluated the total number of Social Security Insurance (SSI) and Social Security Disability Insurance (SSDI) awards made to SCI persons in the hope that that data might yield an estimate of SCI incidence, assuming that a large number of SCI persons receive such benefits. The Office of Research Statistics and International Policy (ORSIP) provided data for 1979 (Table 5).[20]

A number of explanations can be given as to why these figures are so much lower than even the most conservative estimates of SCI incidence. First, not everyone is eligible for either SSDI or SSI; SSDI requires a substantial and recent history of covered employment, and SSI employs a rather strict means test. Second, injured persons who have not exhausted a large part of their assets or who manage to continue to engage in some degree of gainful activity are not included. Third, persons with multiple injuries or health problems, including SCI, may have other ICD codes listed as their

TABLE 4. SCI INCIDENCE IN EASTERN KENTUCKY. 1975–1980

Year	*1975–1976*	*1976–1977*	*1977–1978*	*1978–1979*	*1979–1980*
SCI[a]	82	73	52	69	79
Paraplegia	46	34	26	34	29
Quadriplegia	36	39	26	35	50

Tibbs, P.A. (June 15, 1984). Personal communication.
[a]80% new cases, 20% readmissions, 5% of patients from outside catchment area.

TABLE 5. SSA DISABILITY INSURANCE AWARDS. 1979

UCD-9-CM Code	*Total Awards*	
	Disabled Workers[a]	*Disabled Adult Child*
806	1149	131
952	900	119
TOTAL	2049	250

Carroll, J.J. (Feb. 15, 1984). Personal communication.
[a]In addition, a number of nonconcurrent SSI and SSDI awards were made to widows aged 50–64.

primary reason for the award. Fourth, there are employees of other systems, such as federal or railroad workers, who are not included. The California Department of Rehabilitation's 1982 Report on the Independent Living Centers—23 ILCs serving a total of 22,000 clients—indicates that for 46% of clients, the major source of income was SSI; for 17% it was SSDI.[21]

In addition to ORSIP, the SSA also has a Division of Disability Studies, which recently published the "1978 Survey of Disability and Work."[5] This study, which concentrates on functional forms of disability, does not list any conditions beyond the ICDA-8 Code of 738, which means that all codes between 738 and 959 are indiscriminately lumped in a column headed "All others, including unknown."[5] In response to our inquiry, Aaron Krute, Director of the Division, reported that only 314 persons of a total of 9859 completed interviews "reported any sort of paralysis in the 1978 survey, and only 121 sample persons reported spinal cord injuries."[22] This suggests a national total of approximately 225,000. Given the sampling variability associated with the survey, the true number of SCI persons lies between 150,000 and 300,000.

The National Highway Traffic Safety Administration (NHTSA): According to a recent NHTSA report, there were 56,928 SCI's in 1981 caused by motor vehicle accidents (MVA). Only 5370 of these injuries—Abbreviated Injury Scale (AIS) 5 and 6—were considered to be severe enough to have resulted in paraplegia and quadriplegia. The report rather implausibly states that 4492 of these AIS-5 and AIS-6 level SCI were to fatalities and only 878 to survivors.[23] Even if MVA's resulting in permanent paralysis appear to have decreased in recent years, the estimates in the NHTSA report are likely and contradict previous studies that estimate that MVA caused paralysis is between 2500 and 3000 people. Smart and Sanders state, "The total number of motor vehicle-related spinal cord injury in 1974 is estimated at 5,315...approximately 1,938 are deaths-on-arrival and 447 in-hospital fatalities are projected...(this leaves) 2,930 hospital survivors."[24]

The Veterans Administration SCI Service: The VA operates a network of 19 centers located in the continental U.S. and Puerto Rico. An extensive 6-year (1976–1981) study permitted the VA to identify a total of 16,279 SCI veterans. By December 1983, the number had grown to 18,218.[25] The VA currently estimates that there are between 23,000 and 25,000 SCI veterans living in this country. One factor that makes the VA data interesting for comparison is that 56% of the 16,279 injuries are "non-service connected." This suggests that a majority of veterans were stricken while they were part of the civilian population. The total veteran population as of September 30, 1982, was 28.5 million. About 98% of veterans with traumatic SCI were men, as opposed to 80% of SCI in the general population.

Estimation of 1978 prevalence based on CDS data

The CDS estimate of SCI prevalence in California in 1978 was about 32,500 persons among the working age population aged 16–64. Trauma-induced SCI constitutes only two thirds, or about 21,700 persons, of the total estimate. This ratio corresponds closely to the 67.7% of respondents who listed SCI as their "primary disabling condition." If we assume that the Bureau of Census estimates of 141.3 million working age population in the United States and 14.5 million in California, direct extrapolation of the CDS estimate suggests a national figure of 211,462 working age individuals with SCI. This figure is rounded to 211,000.

The CDS data reflect only working age populations in California. The extrapolation of this prevalence figure to the entire population of the United States requires the following corrections. First, we must add the prevalence of SCI for young people, i.e., ages 1–15 years. Second, the prevalence for SCI people over 65 years of age must be included. Third, there may be a propensity for SCI people to live in California. These will be considered in sequence below.

The NSCIDRC databank, containing more than 6000 traumatic cases, suggests that about 5.9% of SCI incidence in a given year is in individuals aged 15 or less years. Prevalence for a given age can be roughly estimated from the summed incidence from 1 year through the given year. For example, the prevalence of SCI in the 2-year-old group approximates the sum of incidences in 1- and 2-year-

olds. The prevalence of SCI in 15-year-olds approximates the sum of incidences in ages 1 through 15. Using this approach, which assumes a constant age-specific incidence over the 15 years preceding 1978, we estimate the prevalence of SCI in individuals of 1–15 years old to be 22.4% of total incidence. If we assume the latter is 11,000, prevalence for the age group 1–15 would be 2464. If we assume a mortality rate of 1.5% per year, we need to subtract 554 (1.5% × 15 × 2464), ending with an SCI prevalence of 1910 for individuals less than 16 years old. We round this to 2000.

The SCI population on the whole is getting older and living longer. Life expectancy is improving for all categories of SCI.[26–28] The proportion of spinal-injured veterans aged 65 or older, for example, has grown from 5.99% in 1976 to 7.21% in 1978 and close to 10% in 1981. Assuming that the same ratios can be applied to the civilian population, we calculate that about 15,246 (7.21% × 211,462) persons 65 years or older suffer from SCI.[26–29] This figure is rounded to 16,000.

There may be a higher propensity for SCI persons to live in California as opposed to elsewhere in the United States, perhaps due to the warmer climate. In 1981, 11.59% of 25,000 SCI veterans lived in California, compared to 11.2% of the 28.5 million total veteran population.[25] This suggests that SCI veterans may have a slightly higher propensity to live in California than the general population of veterans. Florida, for example, has 6.98% of SCI veterans vs. only 4.71% of the general VA population. Likewise, Massachusetts has 4.58% of SCI versus 2.91% of general veterans. The ratios are reversed for such states as New York, Pennsylvania, New Jersey, and Michigan.

If we add the estimates of SCI prevalence for age groups 1–15 years and older than 65 years, i.e. 2000 and 16,000 respectively, to the extrapolated CDS prevalence of 211,000 working age SCI persons, we obtain 229,000 which is revised downward by 5% to correct for propensity of SCI persons to live in California. We end up with a figure of 218,000 SCI people living in the United States in 1978.

Estimate of 1984 prevalence and comparison with other estimates

To estimate the 1984 prevalence, we simply add to the 1978 baseline prevalence the anticipated increase in prevalence due to continued incidence of SCI and subtract the losses due to mortality. The expected mortality losses are applied separately to the prevalent population in 1978 to predict how many SCI persons living in 1978 will still be living in 1984. The incidence between 1978 and 1984, corrected for mortality, is added.

A recent (1973–1980) survival study by the NSCIDRC indicates that mortality rate among prevalent cases averages 8.5% during the first year and 1.5% per year after the first postinjury year.[11] Let us assume an incidence of 11,000 and prevalence of 220,000 in 1978. In 1979, we would expect 935 (8.5% × 11,000) of the persons injured during 1978 to die and 3300 (1.5% × 209,000) of persons injured before 1978 to die, leaving 215,765 survivors. By 1980, 3236 (1.5 × 215,765) SCI individuals from the 1978 population will die. Carrying this analysis further, we estimate that in 1984, there will be about 200,000 survivors from the 1978 SCI population. Thus, using the same assumptions of incidence and mortality, we estimate SCI prevalence in 1984 to be about 238,000.

How does our prevalence estimate compare with other estimates? DeVivo,[7,30] for example, using SCI relative mortality ratios and a 1980 prevalence estimate of 906 per million, would have found for 1984 a prevalence of 208,380. Bracken et al.[10] suggested an incidence of 40.1 per million. If a 25-year life expectancy is assumed, we would expect a prevalence of about 235,000. Likewise, the data from the Florida and Virginia registries indicate an incidence rate of 30 to 40 per million, which give similar 1984 prevalence values. Note, however, that there may be a gradual decrease in traumatic SCI incidence. In Florida, for example, the rate of incidence went down from 40.3 per million in 1980–1981 to 33.1 per million in 1983–1984. The situation is similar for Virginia, where the rates fell from 37.3 per million in 1981 to 29.5 per million in 1983.

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COMMENT

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This study clearly shows how difficult it is to assess accurately the incidence and prevalence of SCI in a large population. Epidemiologic studies involving smaller communities may be skewed because of the small sample size and significant variation of incidence and prevalence in different communities. National statistics and surveys are grossly inadequate for various reasons and are subject to both overestimations and underestimations. It is, therefore, remarkable that heretofore published studies using different methods have established similar figures for the annual incidence of traumatic SCI, i.e., 30 to 35 cases per million population, with relatively little variation between years. This indeed gives good credence to the accuracy of these findings. The most accurate incidence figures would probably be obtained from state registries, such as in Florida, Virginia, and recently New Jersey. The registration of all traumatic SCIs is mandated by law to ensure appropriate services following the injuries. Interestingly, the yearly incidence in Florida and Virginia, according to their registries, has gradually decreased during the past 5 years, perhaps, due to the Model Spinal Cord Injury Systems prevention efforts and greater public awareness. This decrease has occurred during a period of time when emergency medical services have improved vastly and, presumably, a proportionally greater number of SCI victims are brought to hospitals alive. The future trend is impossible to predict, although further decline may be expected with strict enforcement of laws and regulations about the use of seat belts, driving while intoxicated, and registration and licensing of handguns, all major etiologic factors in traumatic SCI.

Assessment of the prevalence of SCI also has been difficult. Although figures of up to 500,000 cases in the USA have been mentioned, sophisticated studies more commonly estimate the prevalence of SCI to be about 200,000. This figure has been growing with each new survey, as might be expected, since the survival and life expectancy of SCI persons has been steadily improving. Population studies to identify SCI individuals in a given community are difficult to perform. An annual incidence of just over 30 per million and a prevalence of 900 to 1000 per million make SCI a relatively rare condition mandating a very large study sample, which would be both expensive and time consuming.

The Ergas study is valuable in that it reviews multiple approaches to assess the incidence and prevalence of SCI. Additionally, the author has contacted personally many authorities for their own views and opinions. His final assessments of SCI incidence as 11,000 and prevalence of 238,000 are somewhat higher than in previously reported studies.

COMMENT

Wise Young

Accurate assessment of the incidence and prevalence of clinical SCI is a difficult but exceedingly important task. Estimates of the number of SCI cases are used to justify allocation of health care resources and the priorities of research funding agencies. The article by Dr. Ergas does not provide us with radically different estimates of either the incidence or prevalence of SCI in the United States. His conclusion that about 11,000 new cases of traumatic SCI occur per year and that about 238,000 people in the United States have SCI injury comes suprisingly close to figures suggested in several other epidemiologic studies. The article, however, serves a useful purpose by illustrating clearly the insufficiency of available databases on SCI.

The most commonly used sources of data for analyzing the incidence and prevalence of SCI in the United States are 2 annual surveys conducted by the National Center for Health Statistics, i.e., the National Health Interview Survey (NHIS) and the National Hospital Discharge Survey (NHDS). Dr. Ergas criticizes the data from these surveys, pointing out that they do not account for multiple hospital admissions/discharges and that the scheme for listing diagnoses in these surveys can lead to misclassification of patients with SCI. Although these criticisms are valid, his claim that these 2 failings, respectively, result in roughly doubling and halving of the number of patients with SCI is not well supported. For example, it is uncertain whether NSCIDRC data, which come from mostly rehabilitation centers, can be used to criticize NHDS surveys, which are based only on short-stay hospitals.

The databases upon which Dr. Ergas chose to rest his case, moreover, all suffer from equally serious weaknesses. For example, the California Disability Survey (CDS) relied on telephone interviews to define the number of households and individuals with SCI. The sampling error rate is not known, and self-reported conditions are not likely to be as reliable as hospital diagnoses. The regional spinal injury center data require poorly substantiated assumptions concerning the catchment area and the proportion of spinal injury cases from the catchment area being admitted or reported to a given center. Information from such organizations as the Social Service Administration, National Highway Traffic Safety Administration, and the Veterans Administration are skewed toward limited and nonrepresentative populations.

The convergence of all the estimates from these disparate sources toward an annual incidence of about 11,000 new cases of SCI and 238,000 SCI prevalence lends some credence to the figures. Dr. Ergas uses as a base figure the CDS estimate of 32,500 working age persons with SCI in the state of California. He assumes that only two thirds of these are trauma induced and adds the number of spinal-injured people not of working age. He then generalizes the prevalence in California to the nation in 1978, correcting the number downward by 5% for the propensity of spinal-injured people to migrate to and live in California. The current prevalence was obtained by adding the incidence of cases between 1978 and 1984 to the base figure and deducting mortality.

The long string of assumptions required for the final prevalence estimate illustrates clearly the lack of hard data on the subject. Each assumption can be questioned. Given all the caveats, the accuracy of the final figure cannot be easily assessed. Dr. Ergas, nevertheless, did a commendable job gathering together so many sources of data on the subject. One can only hope that, in the long run, inaccuracies of individual assumptions balance each other out.

The article comments little about the social and economic impact of SCI. Let us assume that 250,000 working age spinal-injured people now live in the United States and that this number can be expected to increase by 6000 each year. It has been suggested[1] that each spinal injury victim costs the federal government $16,000 ($14,000 in 1980 dollars) per year of direct medical payments. Thus, the current burden imposed by SCI on the federal government adds up to $4 billion a year and will increase by at least 2–3% per year. If treatment can reduce the SCI population by 1%, the savings to the government would far exceed the amount of funding currently allocated to SCI research (about $20 million per year by the National Institutes of Health),

REFERENCE

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D R A F T
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MEMORANDUM

Date: March 22, 1991

To:
Louisa Adelung
Catherine Bontke
Robert Campos
R. Edward Carter
Rebecca Clearman
William Donovan
Marcus Fuhrer
Gayla Harris
Karen Hart
Shuh-Ming Hsu
Frances Pendergraft
Saleh Shenaq
Cheryl Sohrabian
Charlotte Stelly-Seitz

From: Charlie Beall

As you know, I am committed to developing a functional strategic plan for TIRR which will guide us into the 21st Century. I believe this plan should focus principally upon our programs. It should affect our operational decision-making process, and it should determine allocation of present and future resources necessary to reach our objectives.

In order for our plan to be maximally effective, it must clearly take into account our present strengths as well as our weaknesses, and it must be based on a reliable assessment of market conditions and trends. It should also encompass the broad range of TIRR activities, including research and education, and it should be soundly tied to TIRR's mission and organizational philosophy.

As the first step in an interactive strategic planning process, I would like each of you to respond to the attached survey. In so doing, I encourage you to solicit input from staff members and colleagues in your department, program, or service. Following the completion and summary of this first-cut data, I plan to meet with you, as a group, to review and discuss the product of our shared thoughts. At that point, it will be important to begin a shaping and validation process which will involve our board of trustees and other stake holders whom we may identify.

While our plan must be dynamic enough for us to adapt to changing circumstances, it must also be concrete enough for us to move deliberately forward. In order for us to have our strategic plan sufficiently well developed to guide our budget planning process this year, we need to move quickly ahead. Therefore, I would like your responses to this survey to be transmitted to me, along with any supplementary information which you would like to present at this time, by April 15, 1991.

For reference, you will find attached certain pertinent materials. If you have additional reference material which you feel may be useful in our planning efforts, please forward it to

Lex Frieden for further review and distribution. Also, if you have any questions or suggestions concerning this stage of plan development, feel free to contact Lex or me. Thank you for your cooperation and participation in this important activity.

cc: Lex Frieden

STRATEGIC PLAN
Survey I

Please respond on separate paper to the following questions. Be as concise and as specific as possible. Short phrases and outlines are welcome. This will not be the last opportunity for elaboration or input. Forward completed responses to Charlie Beall by April 15, 1991. If you have any questions about this exercise, contact Lex Frieden at ext. 5283. Thank you.

1. What primary program or service components, and what research and education programs should TIRR maintain and/or develop over the next three years? (List and provide brief rationale.)

2. What reallocation of existing resources (i.e., personnel, facilities, administrative support, etc.) or what new resources will be necessary to facilitate implementation of programs/services listed above.

3. If appropriate, explain how the above suggestions relate to:

   a) TIRR's overall research, education, and clinical service mission,

   b) patient/client needs,

   c) TIRR strengths,

   d) TIRR weaknesses,

   e) competitive forces,

   f) sponsorship options,

   g) health care and disability policy trends,

   h) health care financing and industry trends, and

   i) trends and expected developments in the field of rehabilitation.

4. If action is taken to carry out the suggestions made above, in what ways, if any, would TIRR be different in three years than it is today?

3/22/91

THE INSTITUTE FOR REHABILITATION AND RESEARCH

MISSION

As its fundamental purpose, TIRR will act to return the physically impaired person to an autonomous, active, and productive, community-based lifestyle outside of an institution, through the provision of specialized services, including hospital care.

TIRR will provide specialized tertiary medical and comprehensive rehabilitation programs for complex rehabilitation problems as well as general rehabilitation programs, and will be a knowledge resource for other professionals, community hospitals and rehabilitation services for the region. TIRR will serve the acute intercurrent needs of the severely physically disabled patient.

TIRR will continue to be one of the world leaders in medical rehabilitation programs, rehabilitation research, and education.

Specifically, TIRR will improve the rehabilitation process through research and education. We will originate, demonstrate, apply, evaluate, and disseminate new medical and surgical diagnostic and therapeutic techniques, perspectives, technologies, management techniques, and care delivery system structures and networks that improve the effectiveness and efficiency of the rehabilitation process.

Source: TIRR Long Range Plan, 1985

Census Projections
Planning for 1991

PROGRAM DESCRIPTIONS

SCI: Quad I - Rehab I Quad
Quad Other - Rehab II-IV Quad
Para I - Rehab I Para
Para Other - Rehab II-IV Para
SCI All - Rehab I-IV Quad & Para

TBI: Rehab I - TBI

AMPUTEE: Amputee I - Rehab I Amputee
Amputee Other - Rehab I-IV Amputee
Amputee All - Rehab I-IV Amputee

STROKE: Rehab I - Stroke

PEDI: Rehab I - Pedi
Age 15 & Under, All Diagnoses

SURGERY: Plastics - All Plastic Surgery
All Plastic Medicine
Surgery Other - Urol Surgery
Neuro Surgery
General Surgery
Ortho Surgery

OTHER: Rehab V - All Rehab V
(Not including surgery)
Urol Med
Ortho Med
Neuro Med
Acute Med
Resp
Pain

1990
Discharge Analysis

Program Specific

	1988	1989 (± % 1988-89)	1990 (± % 1989-90)
SCI			
Quad I	57	35 (-38.6)*	53 (+51.4%)**
Quad Other	50	64 (+28)	42 (-34.3%)
Para I	35	29 (-17.1)*	31 (+6.8%)**
Para Other	56	40 (-28.5)	31 (-22.5%)
SCI TOTAL	198	168 (-15.1)	157 (-6.5%)
TBI I	64	78 (+21.8)	72 (-7.6%)
TBI Other	9	3 (-66.6)	10 (+233%)
TBI TOTAL	73	81 (+10.9)	82 (+1.2%)
Amputee I	10	14 (+40.0)	13 (-7.1%)
Amputee Other	13	7 (-46.1)	5 (-28.5%)
AMPUTEE TOTAL	23	21 (-8.6%)	18 (-14.2%)
Stroke I	44	39 (-11.3)	37 (-5.1%)
Stroke Other	0	0	2 (+200%)
STROKE TOTAL	44	39	39
Pedi I	41	40 (-2.4)	44 (+10%)
Surgery	41	41 (0)	36 (-12.1%)
Plastic	39	76 (+94.8)	126 (+65.7%)
Other IV	81	65 (+19.7)	34 (-47.6%)
Other	24	18	17
Missing Program	4	4	0
TOTAL:	568	553 (-2.6)	553 (0)

* Combined Total = (-30.4%)
** Combined Total = (+31.2%)

1990
Discharge Analysis

Rehab I - Program Specific

	1988	1989	1990	
Quadriplegic	57	35	53	+51.4%
Paraplegic	35	29	31	+ 6.8%
SCI I	92	64	84	+31.2%
Brain Injury	64	78	72	- 7.6%
Amputee	10	14	13	- 7.1%
Pediatric	41	40	44	+10.0%
Stroke	44	39	37	- 5.1%
	251	235	250	+ 6.3%

PATIENT PROFILES
1990 Discharges
REHAB I ONLY

SEX:

Male	67.7 %
Female	32.3 %

RACE:

White	70.7 %
Black	15.9 %
Hispanic	9.9 %
Asian	.9 %
Other	2.6 %

TELEPHONE AREA CODES:

713	58.6 %
409	21.1 %
512	4.3%

STATES PATIENTS ORIGINATED:

Texas	88.4 %
Louisiana	3.4 %
Maryland	.9 %
Oklahoma	.9 %
Tennessee	.4 %
New Jersey	.4 %
Connecticut	.4 %
Mexico	.4 %
Missouri	.4 %
Ohio	.4 %
Kentucky	.4 %
Illinois	.4 %
Not Named	.3 %

Estimated Incidence of Spinal Cord and Traumatic Brain Injury in the Houston/Galveston Area

Spinal cord injury:	180/year
Traumatic brain injury, moderate to severe--requiring hospitalization:	1,044/year

Source: Estimates based on data obtained from TIRR regional SCI and TBI Centers and on current regional population base estimates of 3.6 million.

Rehabilitation Units and Free Standing Facilities in the Houston Area (partial listing)

****

HOUSTON

Free Standing Facilities

- Houston Rehab Institute
- Del Oro Rehab
- Health South Rehab
- Memorial City Rehab
- Plaza Rehab Hospital @ Kingwood
- Neurobehavioral Institute of Houston
- Cypress Creek Neurobehavioral Institute

Rehab Units within Hospitals

- St. Luke's
- Hermann
- Methodist
- Ben Taub
- Memorial Systems:
  - Southwest
  - Southeast
  - Northwest
  - Northeast

- Twelve Oaks
- Heights
- St. Joseph's
- Bayshore
- Rosewood
- St. John's
- Sharpstown
- Doctor's Hospital Conroe

Facilities Under Construction

- Rehab Hospital of SW Texas - Clear Lake
- Devereaux - Texas City

Outreach

- Transitional Learning Community (Galveston Living Community)
- Project Re-Entry (Major competitor of Challenge Program

****

Rehabilitation Units and Free Standing Facilities in Texas (partial listing)

****

AUSTIN

Healthcare Rehab Center
St. David's Rehab Center
The Rehab Hospital of Austin
Brown/Karhan Hospital

****

BEAUMONT

St. Elizabeth's Hospital
S.E. Texas Rehab Hospital

****

BRYAN/COLLEGE STATION

Rehab Center - Humana Hospital - College Station

****

CORPUS CHRISTI

Rehab Hospital of S. Texas

****

DALLAS

Baylor Inst. for Rehab
Centre for Neuro Skills (Irving)
Community Re-entry Center of Texas
Dallas Rehab Institute
Greenery Rehab Center
Meadowbrook of Arlington
Pate Rehab
Presbyterian Hospital of Dallas
Spring Creek Rehab Hospital
The Rehab Hospital of N. Texas
Timberlawn Hospital Neuropsychiatry Service
Re Entry

****

EL PASO
Providence Memorial Hospital Rehab Center
Rehab Institute of El Paso

FT WORTH

St. Joseph Hospital
The Mabee Rehab Center - Harris Methodist - Ft. Worth
Ft. Worth Rehab Hospital
Health South Rehab Hospital

****

GONZALES

Warm Springs Rehab Hospital

****

HUNTSVILLE

Huntsville Memorial Hospital Rehab Center

****

LINDALE (TYLER)

New Medico Rehab Center of Texas

****

SAN ANTONIO

Rebound Inc.
Rehab Center of S. Texas
Rehab Institute of San Antonio (RIOSA)
Saint Rose Hospital & Rehab Center
Warm Springs, San Antonio
Spring Hill Rehab Network

****

SAN MARCOS

Tangram Rehab Network

****

TEMPLE

Scott & White

****

VICTORIA

Devereaux Foundation