

ECLS Registry Report

International Summary

January, 2017



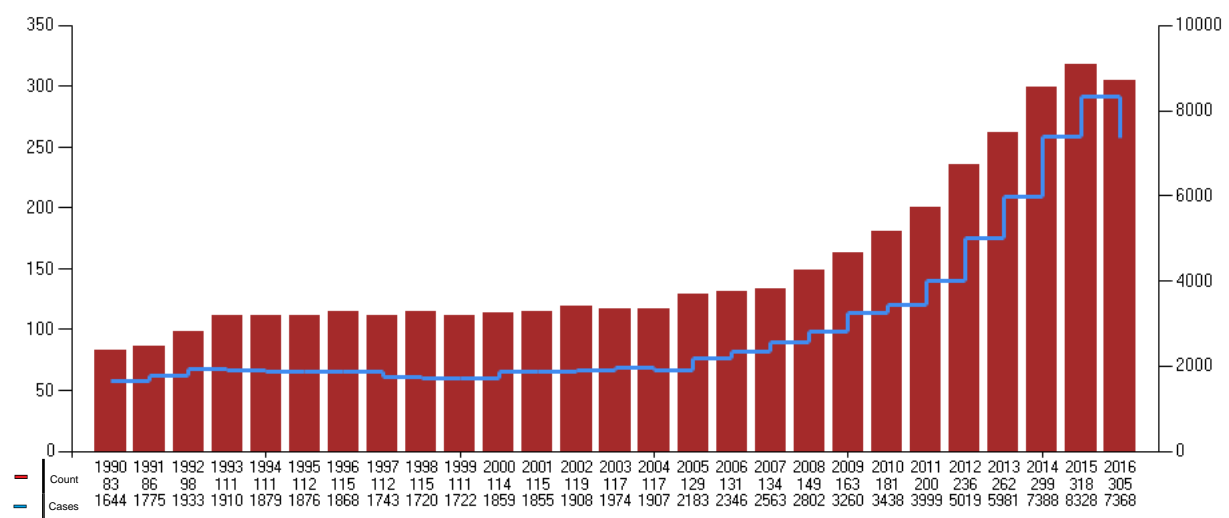
Extracorporeal Life Support Organization
 2800 Plymouth Road
 Building 300, Room 303
 Ann Arbor, MI 48109

Overall Outcomes

	<i>Total Runs</i>	<i>Survived ECLS</i>		<i>Survived to DC or Transfer</i>	
Neonatal					
Pulmonary	29,942	25,205	84%	21,948	73%
Cardiac	7,169	4,643	64%	2,938	40%
ECPR	1,532	1,028	67%	627	40%
Pediatric					
Pulmonary	8,070	5,424	67%	4,632	57%
Cardiac	9,362	6,404	68%	4,758	50%
ECPR	3,399	1,958	57%	1,414	41%
Adult					
Pulmonary	12,346	8,242	66%	7,157	57%
Cardiac	10,982	6,251	56%	4,466	40%
ECPR	3,485	1,382	39%	993	28%
Total	86,287	60,537	70%	48,933	56%

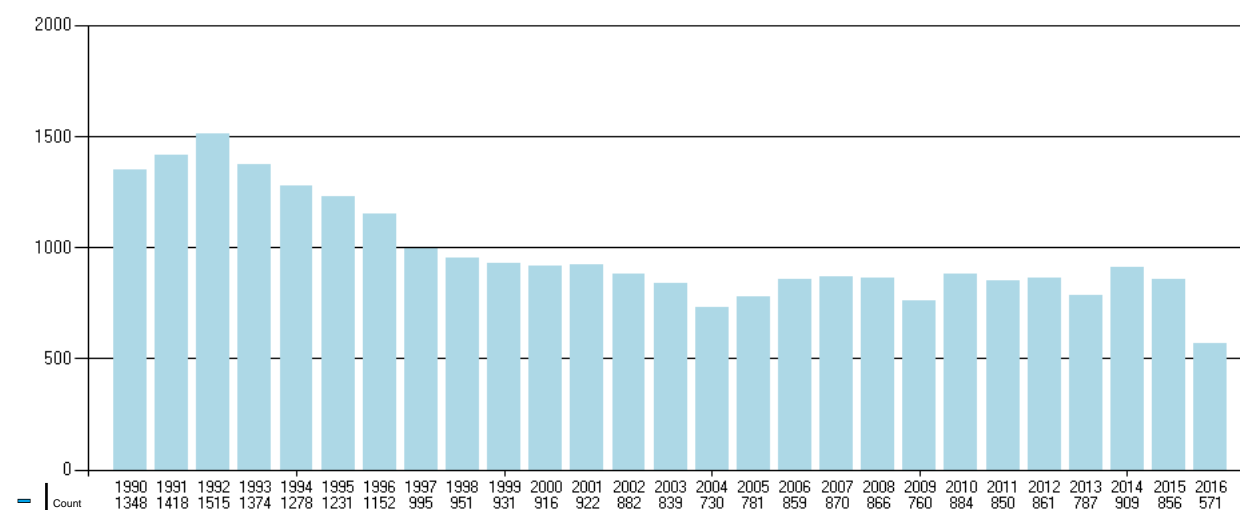
Centers

Centers By Year



Neonatal Respiratory (0-28 days)

Annual Respiratory Neonatal Runs



Neonatal Respiratory Runs by Year

	<i>Annual Runs</i>	<i>Cumulative Runs</i>	<i>Average Run Time</i>	<i>Longest Run Time</i>	<i>No.Survived</i>	<i>% Survived</i>
<=1986	820	820	118	840	659	80%
1987	651	1,471	121	411	558	85%
1988	1,016	2,487	131	673	841	82%
1989	1,119	3,606	134	500	917	81%
1990	1,348	4,954	144	672	1,095	81%
1991	1,418	6,372	153	827	1,141	80%
1992	1,515	7,887	153	1,200	1,180	77%
1993	1,374	9,261	158	959	1,093	79%
1994	1,278	10,539	161	936	972	76%
1995	1,231	11,770	163	794	930	75%
1996	1,152	12,922	167	1,176	841	73%
1997	995	13,917	173	1,131	742	74%
1998	951	14,868	186	1,093	682	71%
1999	931	15,799	183	812	673	72%
2000	916	16,715	188	936	692	75%
2001	922	17,637	190	949	655	71%
2002	882	18,519	189	944	624	70%
2003	839	19,358	195	1,001	553	65%
2004	730	20,088	196	956	473	64%
2005	781	20,869	204	1,006	530	67%
2006	859	21,728	207	1,033	576	67%
2007	870	22,598	198	1,229	583	67%
2008	866	23,464	212	1,133	580	66%
2009	760	24,224	211	1,327	521	68%

2010	884	25,108	201	2,549	611	69%
2011	850	25,958	217	1,175	561	66%
2012	861	26,819	210	1,843	603	70%
2013	787	27,606	210	1,908	526	66%
2014	909	28,515	217	1,164	632	69%
2015	856	29,371	212	1,662	542	63%
2016	571	29,942	211	1,558	362	63%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

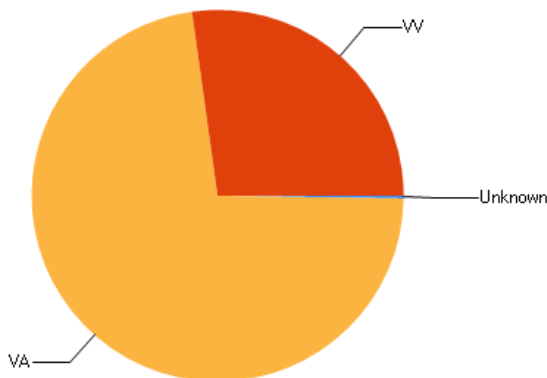
Neonatal Respiratory Runs by Diagnosis

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
CDH	7,889	259	2,549	4,021	50%
MAS	9,076	133	1,327	8,488	93%
PPHN/PFC	5,138	155	1,908	3,948	76%
RDS	1,560	136	1,093	1,309	83%
Sepsis	2,915	144	1,200	2,111	72%
Pneumonia	377	246	936	218	57%
Air Leak Syndrome	134	169	979	99	73%
Other	2,737	182	1,843	1,688	61%

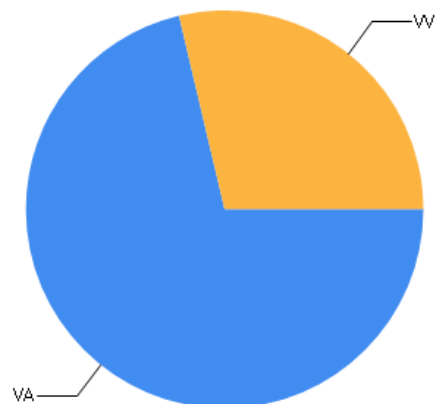
Run time in hours. Survived = survival to discharge or transfer based on number of runs

Neonatal Respiratory Support Mode

Cumulative



Past Year



Neonatal Respiratory Support Mode Details

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
VA	22,344	186	2,549	15,688	70%
VV	8,378	162	1,908	6,741	80%
Unknown	77	191	1,072	48	62%
Other	28	235	956	19	67%
VVA	5	112	281	3	60%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

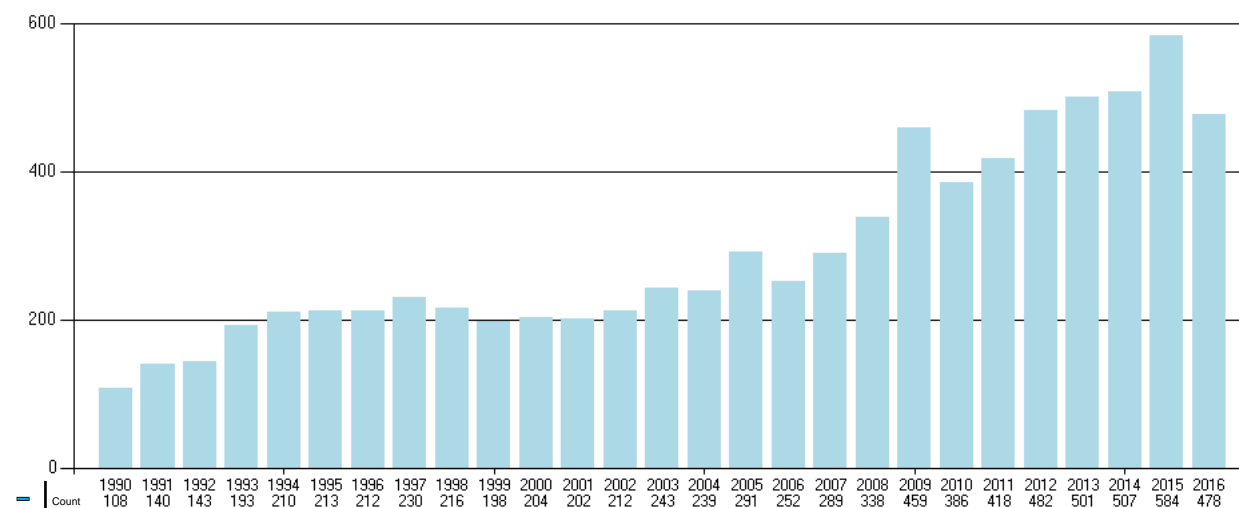
Neonatal Respiratory Complications

	<i>No. Reported</i>	<i>% Reported</i>	<i>No. Survived</i>	<i>% Survived</i>
Mechanical: Oxygenator failure	1,689	5.6%	897	53%
Mechanical: Raceway rupture	91	0.3%	52	57%
Mechanical: Other tubing rupture	169	0.6%	122	72%
Mechanical: Pump malfunction	490	1.6%	318	65%
Mechanical: Heat exchanger malfunction	211	0.7%	138	65%
Mechanical: Clots: oxygenator	5,002	16.7%	3,150	63%
Mechanical: Clots: bridge	2,565	8.6%	1,711	67%
Mechanical: Clots: bladder	4,118	13.8%	2,748	67%
Mechanical: Clots: hemofilter	942	3.1%	414	44%
Mechanical: Clots: other	2,544	8.5%	1,436	56%
Mechanical: Air in circuit	1,390	4.6%	942	68%
Mechanical: Cracks in pigtail connectors	714	2.4%	491	69%
Mechanical: Cannula problems	3,456	11.5%	2,252	65%
Hemorrhagic: GI hemorrhage	495	1.7%	212	43%
Hemorrhagic: Cannulation site bleeding	2,374	7.9%	1,505	63%
Hemorrhagic: Surgical site bleeding	1,871	6.2%	791	42%
Hemorrhagic: Hemolysis (hgb > 50 mg/dl)	3,285	11%	2,033	62%
Hemorrhagic: Disseminated intravascular coagulation (DIC)	921	3.1%	360	39%
Neurologic: Brain death clinically determined	249	0.8%	0	0%
Neurologic: Seizures: clinically determined	2,577	8.6%	1,556	60%
Neurologic: Seizures: EEG determined	413	1.4%	204	49%
Neurologic: CNS infarction by US/CT	2,033	6.8%	1,075	53%
Neurologic: CNS hemorrhage by US/CT	2,285	7.6%	979	43%
Renal: Creatinine 1.5 - 3.0	1,927	6.4%	964	50%
Renal: Creatinine > 3.0	378	1.3%	139	37%
Renal: Dialysis required	935	3.1%	364	39%
Renal: Hemofiltration required	4,794	16%	2,566	54%
Renal: CAVHD required	658	2.2%	279	42%
Cardiovascular: Inotropes on ECLS	6,887	23%	4,180	61%
Cardiovascular: CPR required	684	2.3%	265	39%
Cardiovascular: Myocardial stun by echo	1,313	4.4%	751	57%
Cardiovascular: Cardiac arrhythmia	1,136	3.8%	584	51%
Cardiovascular: Hypertension requiring vasodilators	3,559	11.9%	2,507	70%
Cardiovascular: PDA: R->L	572	1.9%	277	48%
Cardiovascular: PDA: L->R	474	1.6%	304	64%
Cardiovascular: PDA: bidirectional	563	1.9%	321	57%

Cardiovascular: PDA: unknown	258	0.9%	169	66%
Cardiovascular: Tamponade: blood	230	0.8%	101	44%
Cardiovascular: Tamponade: serous	52	0.2%	18	35%
Cardiovascular: Tamponade: air	16	0.1%	8	50%
Pulmonary: Pneumothorax requiring treatment	1,808	6%	1,033	57%
Pulmonary: Pulmonary hemorrhage	1,370	4.6%	583	43%
Infectious: Culture proven infection (see Infections)	1,718	5.7%	886	52%
Infectious: WBC < 1,500	178	0.6%	77	43%
Metabolic: Glucose < 40	877	2.9%	533	61%
Metabolic: Glucose > 240	1,254	4.2%	698	56%
Metabolic: pH < 7.20	1,199	4%	495	41%
Metabolic: pH > 7.60	1,560	5.2%	1,151	74%
Metabolic: Hyperbilirubinemia (> 2 direct or > 15 total)	2,174	7.3%	1,326	61%
Limb: Ischemia	10	0%	2	20%
Limb: Compartment Syndrome	2	0%	1	50%
Limb: Fasciotomy	1	0%	0	0%

Pediatric Respiratory (>28 days and <18 years)

Annual Respiratory Pediatric Runs



Pediatric Respiratory Runs by Year

	<i>Annual Runs</i>	<i>Cumulative Runs</i>	<i>Average Run Time</i>	<i>Longest Run Time</i>	<i>No.Survived</i>	<i>% Survived</i>
<=1986	20	20	182	450	6	30%
1987	14	34	204	595	6	42%
1988	38	72	245	648	13	34%
1989	50	122	215	612	29	58%
1990	108	230	268	853	49	45%
1991	140	370	293	1,256	73	52%
1992	143	513	298	933	70	48%
1993	193	706	286	1,144	102	52%
1994	210	916	286	1,156	122	58%
1995	213	1,129	281	1,372	111	52%
1996	212	1,341	292	1,483	126	59%
1997	230	1,571	279	1,258	139	60%
1998	216	1,787	252	1,015	128	59%
1999	198	1,985	247	1,332	120	60%
2000	204	2,189	263	2,437	110	53%
2001	202	2,391	240	2,239	96	47%
2002	212	2,603	230	1,108	130	61%
2003	243	2,846	226	881	145	59%
2004	239	3,085	234	1,222	140	58%
2005	291	3,376	242	1,280	156	53%
2006	252	3,628	271	1,326	132	52%
2007	289	3,917	255	1,309	163	56%
2008	338	4,255	256	1,987	178	52%
2009	459	4,714	288	2,968	258	56%

2010	386	5,100	269	2,140	229	59%
2011	418	5,518	277	2,465	247	59%
2012	482	6,000	250	2,781	301	62%
2013	501	6,501	286	3,086	310	61%
2014	507	7,008	256	1,932	313	61%
2015	584	7,592	307	7,503	351	60%
2016	478	8,070	282	2,699	279	58%

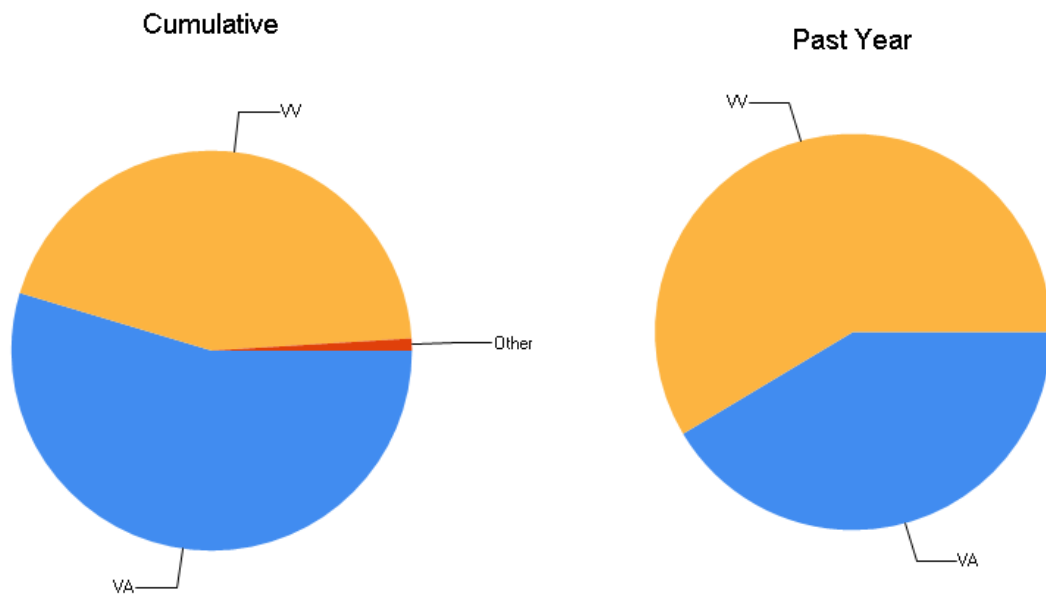
Run time in hours. Survived = survival to discharge or transfer based on number of runs

Pediatric Respiratory Runs by Diagnosis

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
Viral pneumonia	1,756	317	2,968	1,150	65%
Bacterial pneumonia	786	285	1,411	469	59%
Pneumocystis pneumonia	36	369	1,144	19	52%
Aspiration pneumonia	334	241	2,437	227	67%
ARDS, postop/trauma	199	244	935	125	62%
ARDS, not postop/trauma	605	307	3,086	331	54%
Acute resp failure, non-ARDS	1,437	269	7,503	802	55%
Other	2,827	229	2,699	1,460	51%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Pediatric Respiratory Support Mode



Pediatric Respiratory Support Mode Details

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
VA	4,656	269	7,503	2,369	50%
VV	3,779	283	7,503	2,426	64%
Other	83	384	2,968	50	60%
Unknown	65	265	1,932	35	53%
VVA	19	364	985	8	42%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

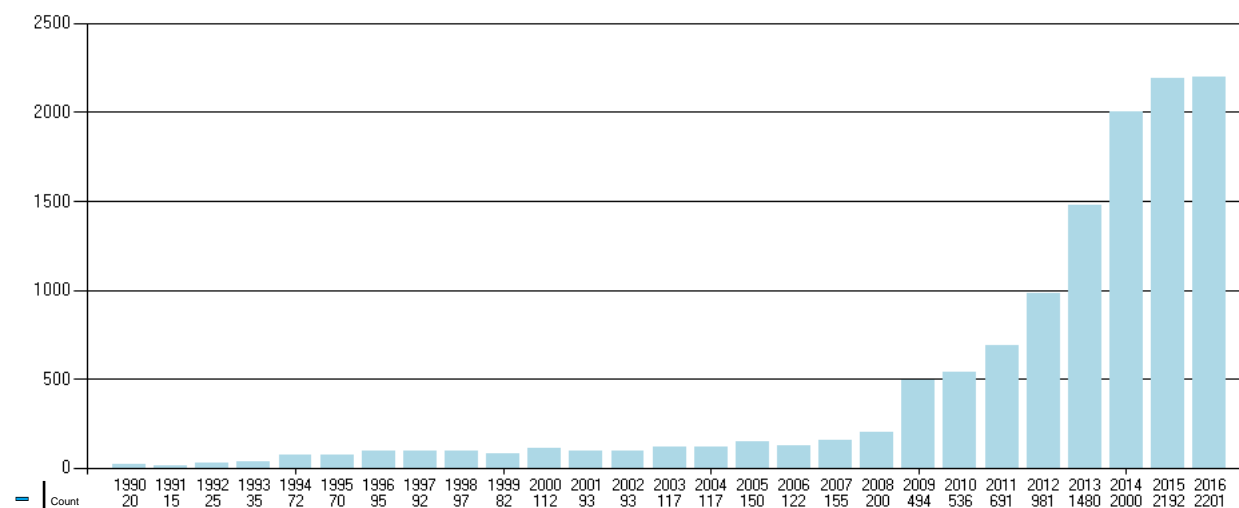
Pediatric Respiratory Complications

	<i>No. Reported</i>	<i>% Reported</i>	<i>No. Survived</i>	<i>% Survived</i>
Mechanical: Oxygenator failure	841	10.4%	362	43%
Mechanical: Raceway rupture	43	0.5%	22	51%
Mechanical: Other tubing rupture	130	1.6%	59	45%
Mechanical: Pump malfunction	175	2.2%	82	47%
Mechanical: Heat exchanger malfunction	30	0.4%	17	57%
Mechanical: Clots: oxygenator	902	11.2%	469	52%
Mechanical: Clots: bridge	281	3.5%	157	56%
Mechanical: Clots: bladder	420	5.2%	229	55%
Mechanical: Clots: hemofilter	363	4.5%	172	47%
Mechanical: Clots: other	999	12.4%	544	54%
Mechanical: Air in circuit	343	4.3%	168	49%
Mechanical: Cracks in pigtail connectors	98	1.2%	47	48%
Mechanical: Cannula problems	1,223	15.2%	662	54%
Hemorrhagic: GI hemorrhage	339	4.2%	103	30%
Hemorrhagic: Cannulation site bleeding	1,471	18.2%	803	55%
Hemorrhagic: Surgical site bleeding	1,002	12.4%	473	47%
Hemorrhagic: Hemolysis (hgb > 50 mg/dl)	840	10.4%	377	45%
Hemorrhagic: Disseminated intravascular coagulation (DIC)	435	5.4%	114	26%
Neurologic: Brain death clinically determined	358	4.4%	0	0%
Neurologic: Seizures: clinically determined	394	4.9%	141	36%
Neurologic: Seizures: EEG determined	131	1.6%	49	37%
Neurologic: CNS infarction by US/CT	341	4.2%	119	35%
Neurologic: CNS hemorrhage by US/CT	517	6.4%	117	23%
Renal: Creatinine 1.5 - 3.0	702	8.7%	245	35%
Renal: Creatinine > 3.0	327	4.1%	110	34%
Renal: Dialysis required	877	10.9%	288	33%
Renal: Hemofiltration required	1,872	23.2%	896	48%
Renal: CAVHD required	726	9%	289	40%
Cardiovascular: Inotropes on ECLS	3,458	42.9%	1,569	45%
Cardiovascular: CPR required	482	6%	122	25%
Cardiovascular: Myocardial stun by echo	119	1.5%	35	29%
Cardiovascular: Cardiac arrhythmia	528	6.5%	196	37%
Cardiovascular: Hypertension requiring vasodilators	1,369	17%	817	60%
Cardiovascular: PDA: R->L	8	0.1%	1	13%

Cardiovascular: PDA: L->R	23	0.3%	10	43%
Cardiovascular: PDA: bidirectional	9	0.1%	2	22%
Cardiovascular: PDA: unknown	1	0%	0	0%
Cardiovascular: Tamponade: blood	164	2%	71	43%
Cardiovascular: Tamponade: serous	35	0.4%	14	40%
Cardiovascular: Tamponade: air	22	0.3%	6	27%
Pulmonary: Pneumothorax requiring treatment	925	11.5%	401	43%
Pulmonary: Pulmonary hemorrhage	648	8%	193	30%
Infectious: Culture proven infection (see Infections)	1,341	16.6%	636	47%
Infectious: WBC < 1,500	272	3.4%	86	32%
Metabolic: Glucose < 40	103	1.3%	32	31%
Metabolic: Glucose > 240	822	10.2%	336	41%
Metabolic: pH < 7.20	670	8.3%	223	33%
Metabolic: pH > 7.60	221	2.7%	123	56%
Metabolic: Hyperbilirubinemia (> 2 direct or > 15 total)	422	5.2%	122	29%
Limb: Ischemia	25	0.3%	8	32%
Limb: Compartment Syndrome	8	0.1%	2	25%
Limb: Fasciotomy	11	0.1%	6	55%
Limb: Amputation	6	0.1%	4	67%

Adult Respiratory (18 years and over)

Annual Respiratory Adult Runs



Adult Respiratory Runs by Year

	<i>Annual Runs</i>	<i>Cumulative Runs</i>	<i>Average Run Time</i>	<i>Longest Run Time</i>	<i>No.Survived</i>	<i>% Survived</i>
<=1986	1	1	16	16	0	0%
1987	1	2	300	300	1	100%
1988	5	7	189	330	1	20%
1989	2	9	234	379	1	50%
1990	20	29	197	671	10	50%
1991	15	44	387	1,246	5	33%
1992	25	69	260	1,083	14	56%
1993	35	104	299	1,326	19	54%
1994	72	176	245	788	35	48%
1995	70	246	199	1,357	40	57%
1996	95	341	178	826	44	46%
1997	92	433	242	981	41	44%
1998	97	530	212	1,238	46	47%
1999	82	612	206	803	39	47%
2000	112	724	211	1,308	62	55%
2001	93	817	231	1,417	55	59%
2002	93	910	195	1,942	52	55%
2003	117	1,027	214	2,035	70	59%
2004	117	1,144	208	1,142	61	52%
2005	150	1,294	198	1,220	74	49%
2006	122	1,416	253	5,014	48	39%
2007	155	1,571	226	2,750	80	51%
2008	200	1,771	195	1,596	104	52%
2009	494	2,265	259	3,018	289	58%

2010	536	2,801	247	1,663	315	58%
2011	691	3,492	256	2,554	402	58%
2012	981	4,473	262	6,248	553	56%
2013	1,480	5,953	279	6,745	888	60%
2014	2,000	7,953	291	3,288	1,215	60%
2015	2,192	10,145	277	7,576	1,237	56%
2016	2,201	12,346	295	5,355	1,356	61%

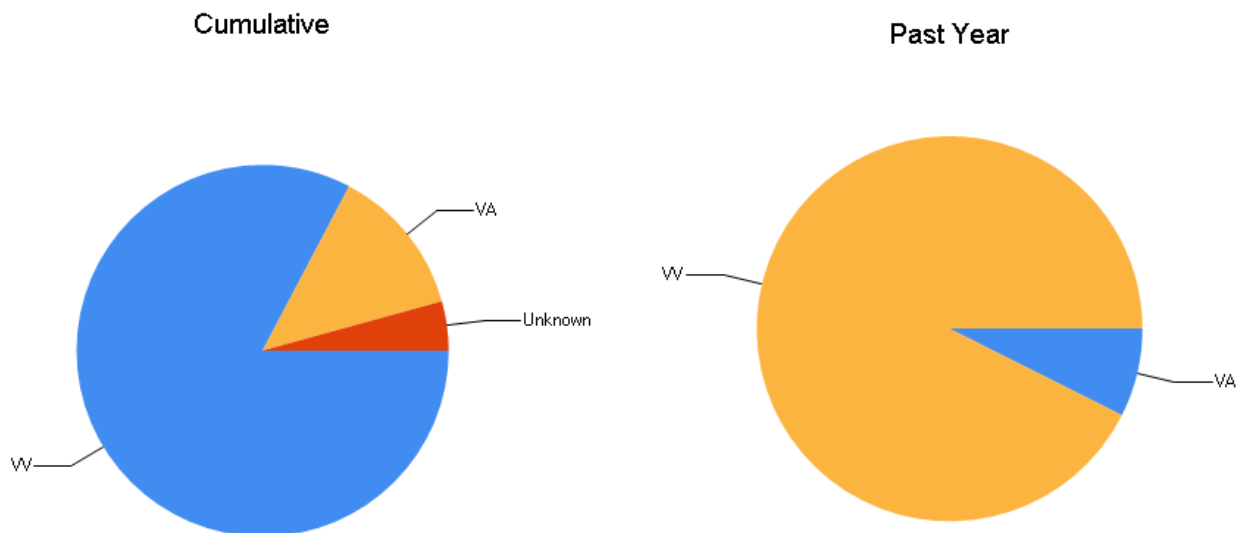
Run time in hours. Survived = survival to discharge or transfer based on number of runs

Adult Respiratory Runs by Diagnosis

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
Viral pneumonia	1,286	331	5,519	848	65%
Bacterial pneumonia	1,460	266	3,288	896	61%
Aspiration pneumonia	219	259	4,799	143	65%
ARDS, postop/trauma	466	258	2,205	264	56%
ARDS, not postop/trauma	1,055	310	6,248	599	56%
Acute resp failure, non-ARDS	2,105	277	4,527	1,202	57%
Other	5,015	247	7,576	2,813	56%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Adult Respiratory Support Mode



Adult Respiratory Support Mode Details

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
VV	10,397	279	7,576	6,259	60%
VA	1,635	240	6,745	705	43%
Unknown	539	231	1,525	264	48%
VVA	86	323	1,993	28	32%
Other	82	362	6,248	41	50%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

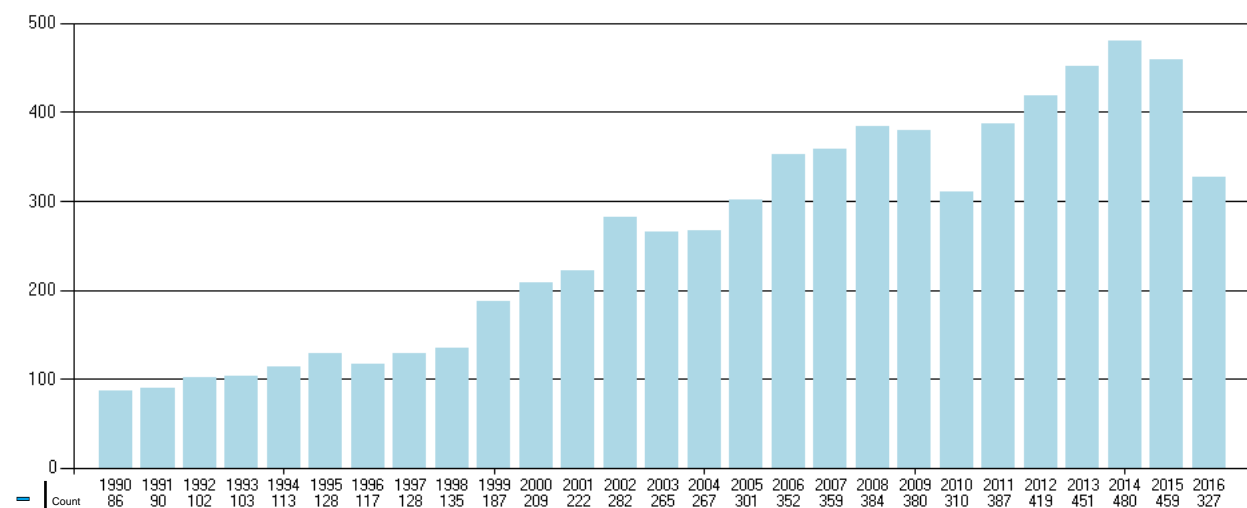
Adult Respiratory Complications

	<i>No. Reported</i>	<i>% Reported</i>	<i>No. Survived</i>	<i>% Survived</i>
Mechanical: Oxygenator failure	1,071	8.7%	517	48%
Mechanical: Raceway rupture	11	0.1%	4	36%
Mechanical: Other tubing rupture	57	0.5%	18	32%
Mechanical: Pump malfunction	181	1.5%	69	38%
Mechanical: Heat exchanger malfunction	24	0.2%	13	54%
Mechanical: Clots: oxygenator	1,650	13.4%	957	58%
Mechanical: Clots: bridge	111	0.9%	65	59%
Mechanical: Clots: bladder	98	0.8%	56	57%
Mechanical: Clots: hemofilter	250	2%	123	49%
Mechanical: Clots: other	615	5%	352	57%
Mechanical: Air in circuit	168	1.4%	78	46%
Mechanical: Cracks in pigtail connectors	50	0.4%	17	34%
Mechanical: Cannula problems	710	5.8%	337	47%
Hemorrhagic: GI hemorrhage	730	5.9%	299	41%
Hemorrhagic: Cannulation site bleeding	1,543	12.5%	790	51%
Hemorrhagic: Surgical site bleeding	1,232	10%	566	46%
Hemorrhagic: Hemolysis (hgb > 50 mg/dl)	707	5.7%	336	48%
Hemorrhagic: Disseminated intravascular coagulation (DIC)	396	3.2%	117	30%
Neurologic: Brain death clinically determined	279	2.3%	0	0%
Neurologic: Seizures: clinically determined	126	1%	51	40%
Neurologic: Seizures: EEG determined	44	0.4%	18	41%
Neurologic: CNS infarction by US/CT	242	2%	68	28%
Neurologic: CNS hemorrhage by US/CT	458	3.7%	94	21%
Renal: Creatinine 1.5 - 3.0	1,947	15.8%	909	47%
Renal: Creatinine > 3.0	1,106	9%	496	45%
Renal: Dialysis required	1,197	9.7%	519	43%
Renal: Hemofiltration required	2,040	16.5%	1,108	54%
Renal: CAVHD required	1,424	11.5%	644	45%
Cardiovascular: Inotropes on ECLS	4,828	39.1%	2,422	50%
Cardiovascular: CPR required	634	5.1%	150	24%
Cardiovascular: Myocardial stun by echo	129	1%	58	45%
Cardiovascular: Cardiac arrhythmia	1,260	10.2%	490	39%
Cardiovascular: Hypertension requiring vasodilators	600	4.9%	351	59%
Cardiovascular: PDA: R->L	6	0%	3	50%

Cardiovascular: PDA: L->R	1	0%	0	0%
Cardiovascular: PDA: bidirectional	1	0%	0	0%
Cardiovascular: Tamponade: blood	186	1.5%	90	48%
Cardiovascular: Tamponade: serous	22	0.2%	12	55%
Cardiovascular: Tamponade: air	5	0%	3	60%
Pulmonary: Pneumothorax requiring treatment	1,033	8.4%	477	46%
Pulmonary: Pulmonary hemorrhage	715	5.8%	276	39%
Infectious: Culture proven infection (see Infections)	2,114	17.1%	1,028	49%
Infectious: WBC < 1,500	253	2%	83	33%
Metabolic: Glucose < 40	210	1.7%	55	26%
Metabolic: Glucose > 240	1,274	10.3%	633	50%
Metabolic: pH < 7.20	1,023	8.3%	358	35%
Metabolic: pH > 7.60	306	2.5%	156	51%
Metabolic: Hyperbilirubinemia (> 2 direct or > 15 total)	1,061	8.6%	429	40%
Limb: Ischemia	124	1%	42	34%
Limb: Compartment Syndrome	36	0.3%	18	50%
Limb: Fasciotomy	35	0.3%	13	37%
Limb: Amputation	22	0.2%	14	64%

Neonatal Cardiac (0-28 days)

Annual Cardiac Neonatal Runs



Neonatal Cardiac Runs by Year

	<i>Annual Runs</i>	<i>Cumulative Runs</i>	<i>Average Run Time</i>	<i>Longest Run Time</i>	<i>No.Survived</i>	<i>% Survived</i>
<=1986	27	27	145	453	19	70%
1987	16	43	96	217	8	50%
1988	30	73	127	336	16	53%
1989	53	126	129	344	30	56%
1990	86	212	124	348	39	45%
1991	90	302	144	600	36	40%
1992	102	404	161	502	42	41%
1993	103	507	169	831	40	38%
1994	113	620	179	667	39	34%
1995	128	748	155	701	43	33%
1996	117	865	136	767	42	35%
1997	128	993	157	1,126	42	32%
1998	135	1,128	150	765	50	37%
1999	187	1,315	146	867	64	34%
2000	209	1,524	134	645	65	31%
2001	222	1,746	147	1,198	80	36%
2002	282	2,028	138	907	100	35%
2003	265	2,293	162	954	102	38%
2004	267	2,560	146	989	111	41%
2005	301	2,861	156	1,871	104	34%
2006	352	3,213	141	726	126	35%
2007	359	3,572	153	952	146	40%
2008	384	3,956	149	721	156	40%
2009	380	4,336	155	1,524	161	42%

2010	310	4,646	149	1,099	144	46%
2011	387	5,033	149	1,034	169	43%
2012	419	5,452	144	1,196	196	46%
2013	451	5,903	151	1,400	202	44%
2014	480	6,383	157	3,737	220	45%
2015	459	6,842	150	1,251	202	44%
2016	327	7,169	164	1,676	144	44%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Neonatal Cardiac Runs by Diagnosis

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
Congenital Defect	5,908	144	1,524	2,356	39%
Cardiac Arrest	93	133	600	30	32%
Cardiogenic Shock	114	149	669	48	42%
Cardiomyopathy	143	214	867	86	60%
Myocarditis	88	256	868	44	50%
Other	714	175	3,737	336	47%

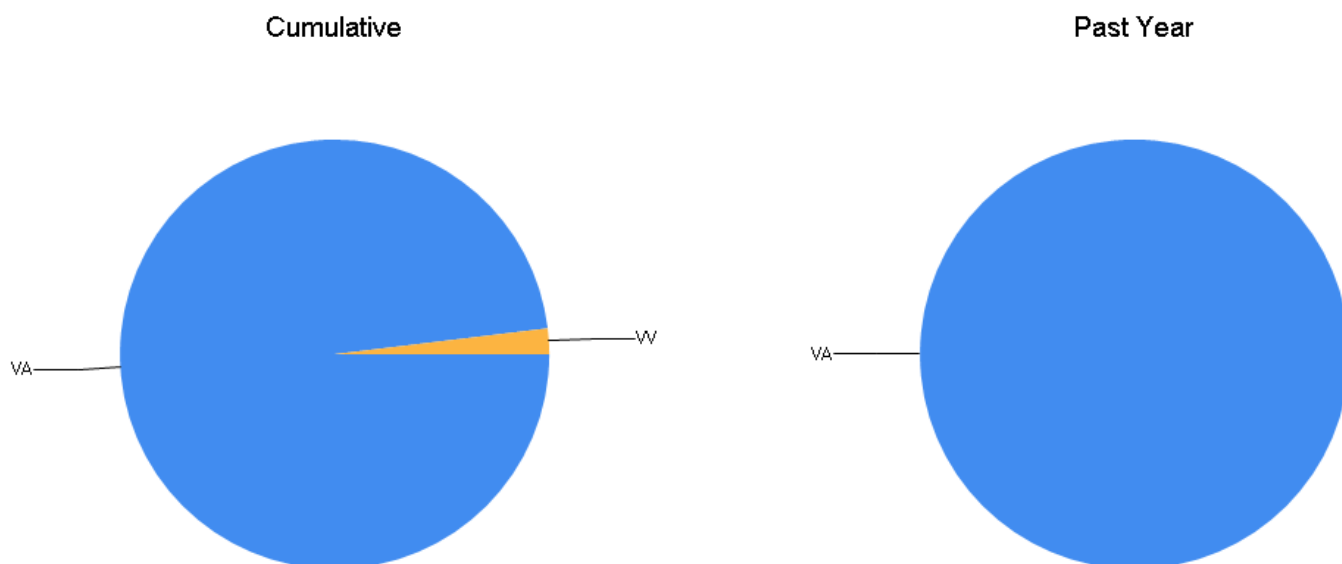
Run time in hours. Survived = survival to discharge or transfer based on number of runs

Neonatal Cardiac Runs by Congenital Diagnosis

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
Left to right shunt (ASD/VSD/PDA/AV canal/AVSD/ECD)	354	147	1,066	134	37%
Left-sided obstructive (aortic stenosis/mitral stenosis/coarctation)	510	149	1,524	176	34%
Hypoplastic left heart	1,598	137	1,198	548	34%
Right-sided obstructive (pulmonary stenosis/pulmonary or tricuspid atresia)	240	133	1,400	98	40%
Cyanotic incr. pulmonary flow (truncus arteriosus/TGA/TGV)	297	143	716	101	34%
Cyanotic incr. pulm. congestion (TAP VR/P APVR)	722	148	1,481	304	42%
Cyanotic decr. pulmonary flow (TOF/DORV/Ebsteins)	1,341	152	1,251	593	44%
Other	846	139	901	402	47%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Neonatal Cardiac Support Mode



Neonatal Cardiac Support Mode Details

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
VA	7,005	150	3,737	2,857	40%
VV	138	182	1,251	66	47%
Unknown	40	134	840	14	35%
Other	31	140	431	9	29%
VVA	3	178	307	0	0%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

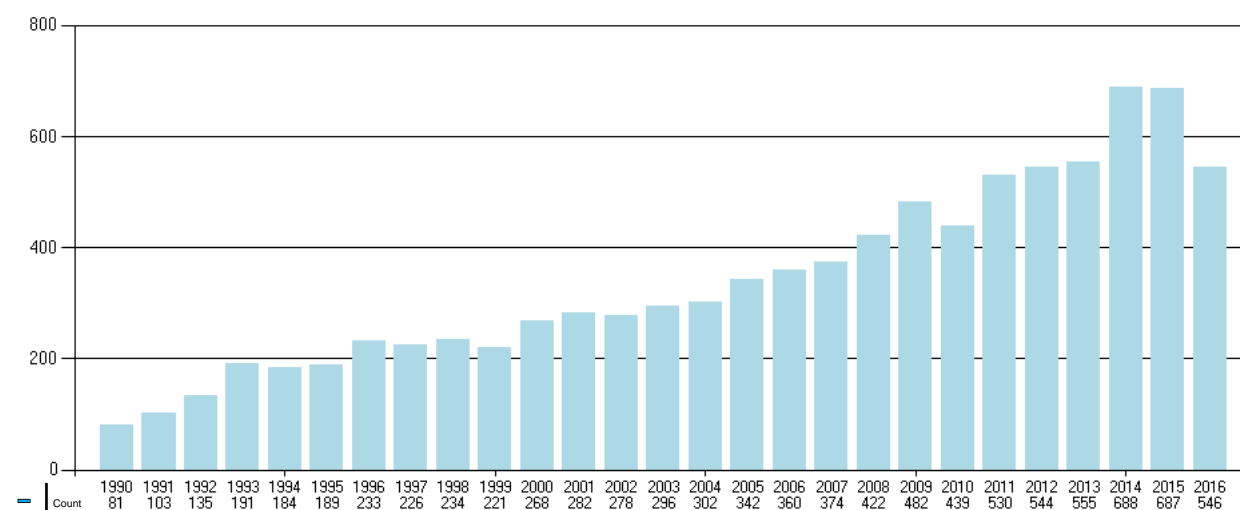
Neonatal Cardiac Complications

	<i>No. Reported</i>	<i>% Reported</i>	<i>No. Survived</i>	<i>% Survived</i>
Mechanical: Oxygenator failure	428	6%	104	24%
Mechanical: Raceway rupture	19	0.3%	6	32%
Mechanical: Other tubing rupture	34	0.5%	11	32%
Mechanical: Pump malfunction	104	1.5%	30	29%
Mechanical: Heat exchanger malfunction	32	0.4%	18	56%
Mechanical: Clots: oxygenator	815	11.4%	257	32%
Mechanical: Clots: bridge	246	3.4%	76	31%
Mechanical: Clots: bladder	380	5.3%	103	27%
Mechanical: Clots: hemofilter	297	4.1%	75	25%
Mechanical: Clots: other	986	13.8%	339	34%
Mechanical: Air in circuit	229	3.2%	70	31%
Mechanical: Cracks in pigtail connectors	43	0.6%	20	47%
Mechanical: Cannula problems	427	6%	147	34%
Hemorrhagic: GI hemorrhage	78	1.1%	11	14%
Hemorrhagic: Cannulation site bleeding	769	10.7%	242	31%
Hemorrhagic: Surgical site bleeding	2,084	29.1%	644	31%
Hemorrhagic: Hemolysis (hgb > 50 mg/dl)	818	11.4%	217	27%

Hemorrhagic: Disseminated intravascular coagulation (DIC)	283	3.9%	49	17%
Neurologic: Brain death clinically determined	70	1%	0	0%
Neurologic: Seizures: clinically determined	448	6.2%	145	32%
Neurologic: Seizures: EEG determined	223	3.1%	71	32%
Neurologic: CNS infarction by US/CT	241	3.4%	64	27%
Neurologic: CNS hemorrhage by US/CT	824	11.5%	202	25%
Renal: Creatinine 1.5 - 3.0	737	10.3%	175	24%
Renal: Creatinine > 3.0	130	1.8%	39	30%
Renal: Dialysis required	534	7.4%	103	19%
Renal: Hemofiltration required	1,863	26%	537	29%
Renal: CAVHD required	481	6.7%	85	18%
Cardiovascular: Inotropes on ECLS	4,014	56%	1,416	35%
Cardiovascular: CPR required	205	2.9%	30	15%
Cardiovascular: Myocardial stun by echo	428	6%	103	24%
Cardiovascular: Cardiac arrhythmia	979	13.7%	280	29%
Cardiovascular: Hypertension requiring vasodilators	687	9.6%	283	41%
Cardiovascular: PDA: R->L	28	0.4%	11	39%
Cardiovascular: PDA: L->R	76	1.1%	21	28%
Cardiovascular: PDA: bidirectional	30	0.4%	8	27%
Cardiovascular: PDA: unknown	13	0.2%	3	23%
Cardiovascular: Tamponade: blood	387	5.4%	119	31%
Cardiovascular: Tamponade: serous	19	0.3%	9	47%
Cardiovascular: Tamponade: air	7	0.1%	2	29%
Pulmonary: Pneumothorax requiring treatment	192	2.7%	47	24%
Pulmonary: Pulmonary hemorrhage	362	5%	71	20%
Infectious: Culture proven infection (see Infections)	499	7%	112	22%
Infectious: WBC < 1,500	82	1.1%	17	21%
Metabolic: Glucose < 40	166	2.3%	53	32%
Metabolic: Glucose > 240	893	12.5%	308	34%
Metabolic: pH < 7.20	495	6.9%	108	22%
Metabolic: pH > 7.60	365	5.1%	166	45%
Metabolic: Hyperbilirubinemia (> 2 direct or > 15 total)	356	5%	116	33%
Limb: Ischemia	21	0.3%	0	0%

Pediatric Cardiac (>28 days and <18 years)

Annual Cardiac Pediatric Runs



Pediatric Cardiac Runs by Year

	<i>Annual Runs</i>	<i>Cumulative Runs</i>	<i>Average Run Time</i>	<i>Longest Run Time</i>	<i>No.Survived</i>	<i>% Survived</i>
<=1986	33	33	87	196	14	42%
1987	34	67	100	312	18	52%
1988	42	109	113	353	15	35%
1989	61	170	125	293	27	44%
1990	81	251	129	544	31	38%
1991	103	354	115	432	47	45%
1992	135	489	137	547	45	33%
1993	191	680	144	1,080	81	42%
1994	184	864	136	720	64	34%
1995	189	1,053	151	984	67	35%
1996	233	1,286	135	721	91	39%
1997	226	1,512	159	864	92	40%
1998	234	1,746	163	1,183	97	41%
1999	221	1,967	150	1,029	93	42%
2000	268	2,235	140	871	128	47%
2001	282	2,517	156	1,490	121	42%
2002	278	2,795	162	1,246	131	47%
2003	296	3,091	164	987	152	51%
2004	302	3,393	164	1,157	138	45%
2005	342	3,735	165	1,207	188	54%
2006	360	4,095	147	1,260	191	53%
2007	374	4,469	170	963	191	51%
2008	422	4,891	150	910	217	51%
2009	482	5,373	148	1,282	313	64%

2010	439	5,812	144	1,059	227	51%
2011	530	6,342	159	3,605	303	57%
2012	544	6,886	152	2,270	309	56%
2013	555	7,441	177	3,605	308	55%
2014	688	8,129	160	3,506	368	53%
2015	687	8,816	177	2,564	403	58%
2016	546	9,362	169	2,977	288	52%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Pediatric Cardiac Runs by Diagnosis

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
Congenital Defect	5,371	144	2,736	2,545	47%
Cardiac Arrest	281	131	2,352	120	42%
Cardiogenic Shock	309	147	2,977	165	53%
Cardiomyopathy	816	201	3,605	490	60%
Myocarditis	443	187	1,246	315	71%
Other	1,922	173	3,605	1,021	53%

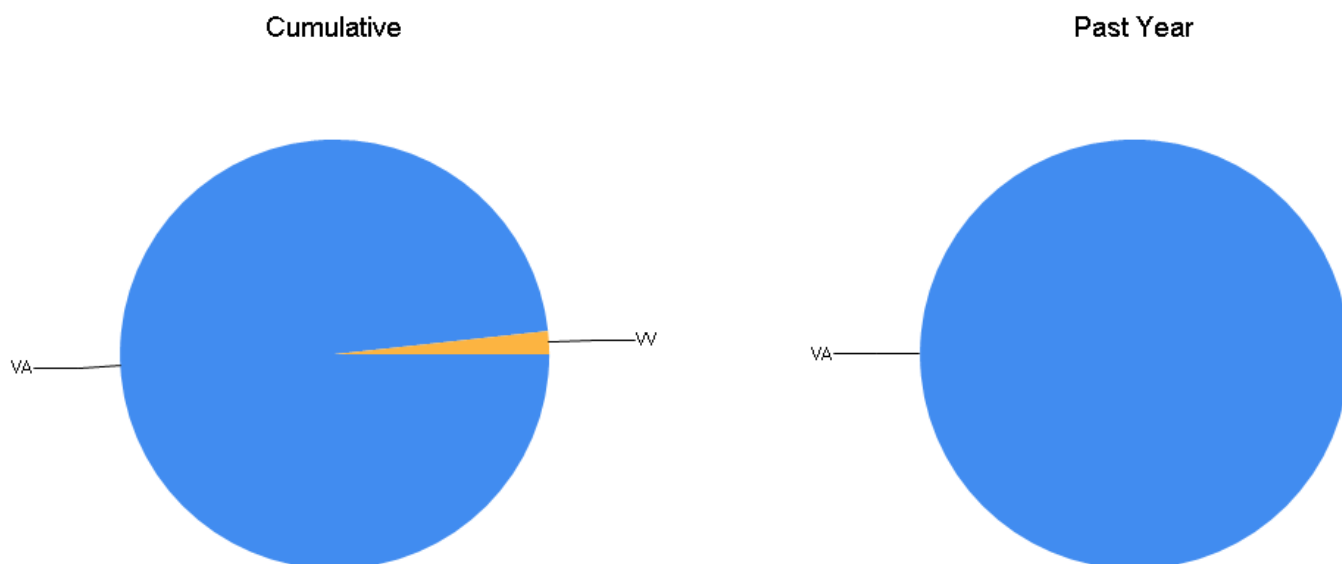
Run time in hours. Survived = survival to discharge or transfer based on number of runs

Pediatric Cardiac Runs by Congenital Diagnosis

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
Left to right shunt (ASD/VSD/PDA/AV canal/AVSD/ECD)	1,043	152	1,080	461	44%
Left-sided obstructive (aortic stenosis/mitral stenosis/coarctation)	562	137	1,260	273	48%
Hypoplastic left heart	614	160	2,736	251	40%
Right-sided obstructive (pulmonary stenosis/pulmonary or tricuspid atresia)	283	127	1,056	146	51%
Cyanotic incr. pulmonary flow (truncus arteriosus/TGA/TGV)	139	132	997	60	43%
Cyanotic incr. pulm. congestion (TAP VR/P APVR)	175	146	1,350	74	42%
Cyanotic decr. pulmonary flow (TOF/DORV/Ebsteins)	898	141	2,573	418	46%
Other	1,657	141	1,282	862	52%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Pediatric Cardiac Support Mode



Pediatric Cardiac Support Mode Details

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
VA	9,100	156	3,605	4,626	50%
VV	160	222	1,531	78	48%
Other	80	264	2,880	36	45%
Unknown	69	150	672	34	49%
VVA	23	207	1,336	14	60%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

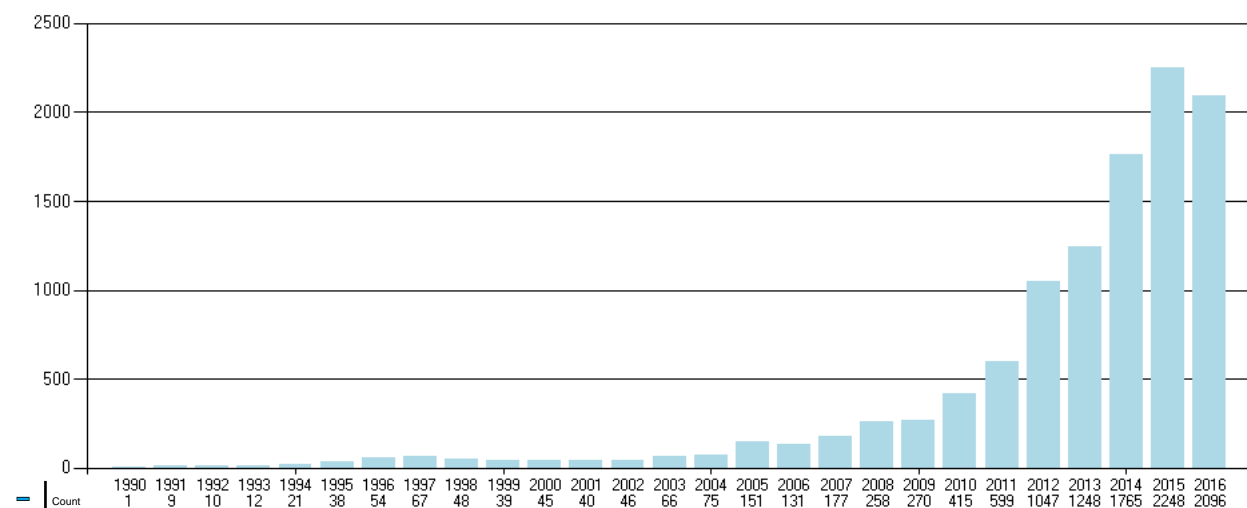
Pediatric Cardiac Complications

	<i>No. Reported</i>	<i>% Reported</i>	<i>No. Survived</i>	<i>% Survived</i>
Mechanical: Oxygenator failure	657	7%	247	38%
Mechanical: Raceway rupture	46	0.5%	21	46%
Mechanical: Other tubing rupture	65	0.7%	19	29%
Mechanical: Pump malfunction	155	1.7%	64	41%
Mechanical: Heat exchanger malfunction	27	0.3%	13	48%
Mechanical: Clots: oxygenator	782	8.4%	355	45%
Mechanical: Clots: bridge	242	2.6%	105	43%
Mechanical: Clots: bladder	263	2.8%	110	42%
Mechanical: Clots: hemofilter	279	3%	90	32%
Mechanical: Clots: other	1,014	10.8%	479	47%
Mechanical: Air in circuit	239	2.6%	104	44%
Mechanical: Cracks in pigtail connectors	78	0.8%	32	41%
Mechanical: Cannula problems	534	5.7%	227	43%
Hemorrhagic: GI hemorrhage	223	2.4%	49	22%
Hemorrhagic: Cannulation site bleeding	1,456	15.6%	703	48%
Hemorrhagic: Surgical site bleeding	2,666	28.5%	1,175	44%
Hemorrhagic: Hemolysis (hgb > 50 mg/dl)	880	9.4%	323	37%

Hemorrhagic: Disseminated intravascular coagulation (DIC)	359	3.8%	102	28%
Neurologic: Brain death clinically determined	398	4.3%	0	0%
Neurologic: Seizures: clinically determined	575	6.1%	155	27%
Neurologic: Seizures: EEG determined	229	2.4%	77	34%
Neurologic: CNS infarction by US/CT	467	5%	167	36%
Neurologic: CNS hemorrhage by US/CT	493	5.3%	128	26%
Renal: Creatinine 1.5 - 3.0	952	10.2%	301	32%
Renal: Creatinine > 3.0	382	4.1%	125	33%
Renal: Dialysis required	853	9.1%	219	26%
Renal: Hemofiltration required	2,064	22%	844	41%
Renal: CAVHD required	665	7.1%	239	36%
Cardiovascular: Inotropes on ECLS	5,279	56.4%	2,412	46%
Cardiovascular: CPR required	303	3.2%	74	24%
Cardiovascular: Myocardial stun by echo	448	4.8%	194	43%
Cardiovascular: Cardiac arrhythmia	1,465	15.6%	629	43%
Cardiovascular: Hypertension requiring vasodilators	1,198	12.8%	668	56%
Cardiovascular: PDA: R->L	6	0.1%	3	50%
Cardiovascular: PDA: L->R	33	0.4%	13	39%
Cardiovascular: PDA: bidirectional	1	0%	0	0%
Cardiovascular: PDA: unknown	6	0.1%	3	50%
Cardiovascular: Tamponade: blood	448	4.8%	186	42%
Cardiovascular: Tamponade: serous	29	0.3%	11	38%
Cardiovascular: Tamponade: air	2	0%	1	50%
Pulmonary: Pneumothorax requiring treatment	231	2.5%	81	35%
Pulmonary: Pulmonary hemorrhage	499	5.3%	152	30%
Infectious: Culture proven infection (see Infections)	1,026	11%	401	39%
Infectious: WBC < 1,500	109	1.2%	21	19%
Metabolic: Glucose < 40	134	1.4%	38	28%
Metabolic: Glucose > 240	1,113	11.9%	483	43%
Metabolic: pH < 7.20	528	5.6%	152	29%
Metabolic: pH > 7.60	289	3.1%	151	52%
Metabolic: Hyperbilirubinemia (> 2 direct or > 15 total)	444	4.7%	146	33%
Limb: Ischemia	35	0.4%	9	26%
Limb: Compartment Syndrome	11	0.1%	4	36%
Limb: Fasciotomy	10	0.1%	4	40%
Limb: Amputation	4	0%	3	75%

Adult Cardiac (18 years and over)

Annual Cardiac Adult Runs



Adult Cardiac Runs by Year

	<i>Annual Runs</i>	<i>Cumulative Runs</i>	<i>Average Run Time</i>	<i>Longest Run Time</i>	<i>No.Survived</i>	<i>% Survived</i>
<=1986	1	1	136	136	0	0%
1988	3	4	231	370	0	0%
1989	2	6	63	102	1	50%
1990	1	7	147	147	0	0%
1991	9	16	134	382	1	11%
1992	10	26	82	303	2	20%
1993	12	38	95	214	2	16%
1994	21	59	117	622	6	28%
1995	38	97	101	438	18	47%
1996	54	151	93	564	16	29%
1997	67	218	84	900	28	41%
1998	48	266	114	786	12	25%
1999	39	305	105	256	13	33%
2000	45	350	104	431	16	35%
2001	40	390	85	259	14	35%
2002	46	436	102	404	17	36%
2003	66	502	130	576	23	34%
2004	75	577	106	733	28	37%
2005	151	728	116	663	48	31%
2006	131	859	136	965	62	47%
2007	177	1,036	116	761	70	39%
2008	258	1,294	119	937	123	47%
2009	270	1,564	125	871	110	40%
2010	415	1,979	135	2,105	182	43%

2011	599	2,578	130	813	221	36%
2012	1,047	3,625	141	2,040	432	41%
2013	1,248	4,873	153	1,593	512	41%
2014	1,765	6,638	146	3,306	745	42%
2015	2,248	8,886	148	2,849	934	41%
2016	2,096	10,982	154	2,941	830	39%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Adult Cardiac Runs by Diagnosis

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
Congenital Defect	406	134	928	141	34%
Cardiac Arrest	487	105	1,017	155	31%
Cardiogenic Shock	2,492	147	3,306	1,045	41%
Cardiomyopathy	681	163	2,105	341	50%
Myocarditis	222	187	873	138	62%
Other	5,927	140	2,941	2,418	40%

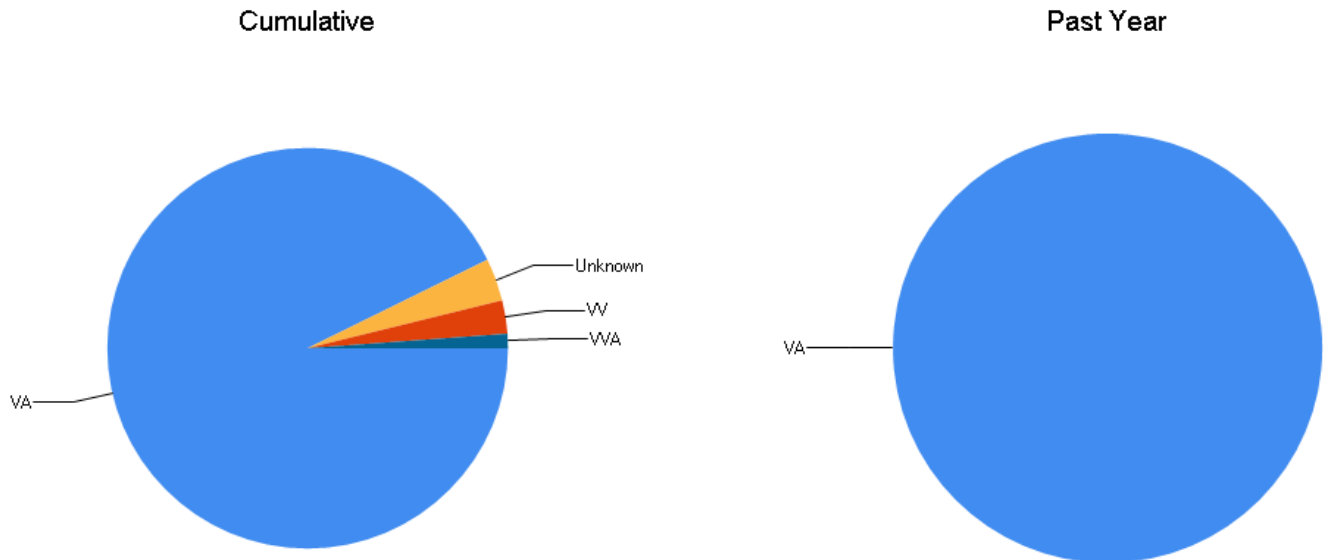
Run time in hours. Survived = survival to discharge or transfer based on number of runs

Adult Cardiac Runs by Congenital Diagnosis

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
Left to right shunt (ASD/VSD/PDA/AV canal/AVSD/ECD)	93	155	928	28	30%
Left-sided obstructive (aortic stenosis/mitral stenosis/coarctation)	177	115	601	57	32%
Hypoplastic left heart	4	47	95	0	0%
Right-sided obstructive (pulmonary stenosis/pulmonary or tricuspid atresia)	12	189	801	4	33%
Cyanotic incr. pulmonary flow (truncus arteriosus/TGA/TGV)	3	232	556	2	66%
Cyanotic decr. pulmonary flow (TOF/DORV/Ebsteins)	46	127	567	24	52%
Other	71	149	446	26	36%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Adult Cardiac Support Mode



Adult Cardiac Support Mode Details

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
VA	10,254	142	3,306	4,229	41%
Unknown	380	112	900	103	27%
VV	297	228	1,386	120	40%
VVA	128	166	1,168	41	32%
Other	109	184	964	51	46%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

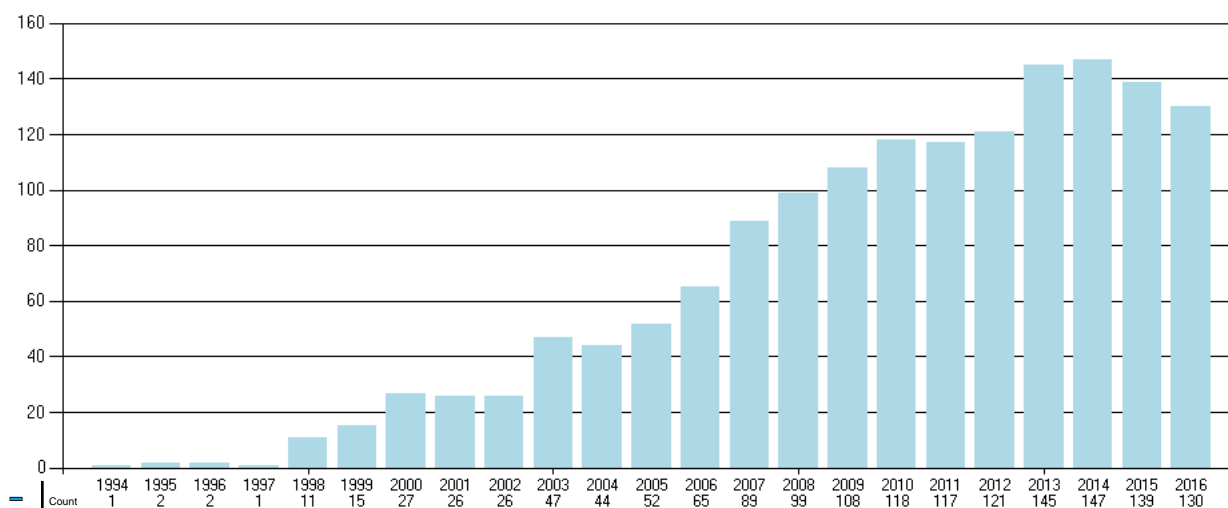
Adult Cardiac Complications

	<i>No. Reported</i>	<i>% Reported</i>	<i>No. Survived</i>	<i>% Survived</i>
Mechanical: Oxygenator failure	664	6%	236	36%
Mechanical: Raceway rupture	6	0.1%	2	33%
Mechanical: Other tubing rupture	13	0.1%	4	31%
Mechanical: Pump malfunction	78	0.7%	24	31%
Mechanical: Heat exchanger malfunction	8	0.1%	5	63%
Mechanical: Clots: oxygenator	902	8.2%	365	40%
Mechanical: Clots: bridge	50	0.5%	27	54%
Mechanical: Clots: bladder	17	0.2%	8	47%
Mechanical: Clots: hemofilter	118	1.1%	28	24%
Mechanical: Clots: other	612	5.6%	249	41%
Mechanical: Air in circuit	117	1.1%	36	31%
Mechanical: Cracks in pigtail connectors	38	0.3%	9	24%
Mechanical: Cannula problems	425	3.9%	147	35%
Hemorrhagic: GI hemorrhage	485	4.4%	119	25%
Hemorrhagic: Cannulation site bleeding	1,924	17.5%	745	39%
Hemorrhagic: Surgical site bleeding	2,111	19.2%	689	33%
Hemorrhagic: Hemolysis (hgb > 50 mg/dl)	602	5.5%	184	31%

Hemorrhagic: Disseminated intravascular coagulation (DIC)	386	3.5%	74	19%
Neurologic: Brain death clinically determined	413	3.8%	0	0%
Neurologic: Seizures: clinically determined	154	1.4%	40	26%
Neurologic: Seizures: EEG determined	67	0.6%	15	22%
Neurologic: CNS infarction by US/CT	418	3.8%	98	23%
Neurologic: CNS hemorrhage by US/CT	236	2.1%	23	10%
Renal: Creatinine 1.5 - 3.0	2,334	21.3%	813	35%
Renal: Creatinine > 3.0	1,304	11.9%	376	29%
Renal: Dialysis required	1,092	9.9%	287	26%
Renal: Hemofiltration required	1,348	12.3%	404	30%
Renal: CAVHD required	1,525	13.9%	437	29%
Cardiovascular: Inotropes on ECLS	5,749	52.3%	2,152	37%
Cardiovascular: CPR required	419	3.8%	67	16%
Cardiovascular: Myocardial stun by echo	638	5.8%	206	32%
Cardiovascular: Cardiac arrhythmia	1,744	15.9%	574	33%
Cardiovascular: Hypertension requiring vasodilators	440	4%	225	51%
Cardiovascular: PDA: R->L	1	0%	0	0%
Cardiovascular: PDA: L->R	3	0%	1	33%
Cardiovascular: PDA: unknown	2	0%	0	0%
Cardiovascular: Tamponade: blood	550	5%	177	32%
Cardiovascular: Tamponade: serous	32	0.3%	11	34%
Cardiovascular: Tamponade: air	1	0%	0	0%
Pulmonary: Pneumothorax requiring treatment	173	1.6%	57	33%
Pulmonary: Pulmonary hemorrhage	309	2.8%	71	23%
Infectious: Culture proven infection (see Infections)	1,407	12.8%	512	36%
Infectious: WBC < 1,500	155	1.4%	46	30%
Metabolic: Glucose < 40	222	2%	11	5%
Metabolic: Glucose > 240	1,409	12.8%	568	40%
Metabolic: pH < 7.20	1,080	9.8%	208	19%
Metabolic: pH > 7.60	439	4%	198	45%
Metabolic: Hyperbilirubinemia (> 2 direct or > 15 total)	1,322	12%	361	27%
Limb: Ischemia	392	3.6%	111	28%
Limb: Compartment Syndrome	114	1%	34	30%
Limb: Fasciotomy	166	1.5%	47	28%
Limb: Amputation	50	0.5%	29	58%

Neonatal ECPR (0-28 days)

Annual ECPR Neonatal Runs

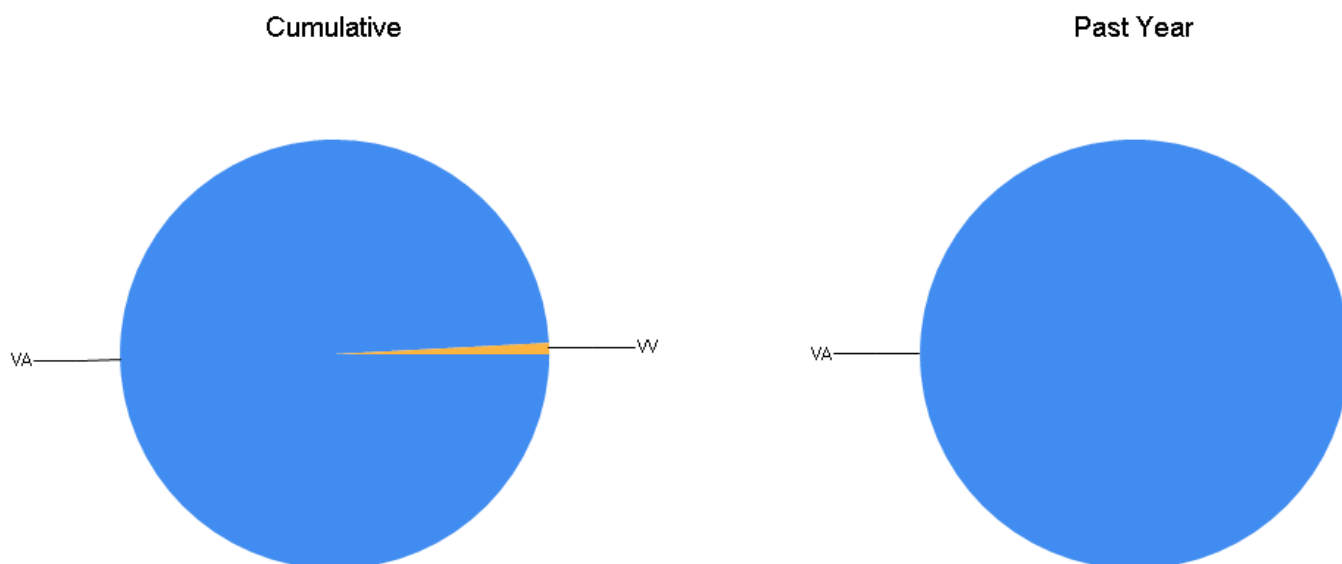


Neonatal ECPR Runs by Year

	<i>Annual Runs</i>	<i>Cumulative Runs</i>	<i>Average Run Time</i>	<i>Longest Run Time</i>	<i>No. Survived</i>	<i>% Survived</i>
1994	1	1	61	61	1	100%
1995	2	3	126	133	1	50%
1996	2	5	136	152	2	100%
1997	1	6	159	159	1	100%
1998	11	17	96	337	5	45%
1999	15	32	82	297	4	26%
2000	27	59	166	857	10	37%
2001	26	85	127	403	9	34%
2002	26	111	111	246	10	38%
2003	47	158	159	902	20	42%
2004	44	202	124	653	19	43%
2005	52	254	152	1,079	16	30%
2006	65	319	124	474	27	41%
2007	89	408	113	700	34	38%
2008	99	507	160	1,082	35	35%
2009	108	615	120	701	46	42%
2010	118	733	126	856	55	46%
2011	117	850	133	924	43	36%
2012	121	971	104	420	51	42%
2013	145	1,116	136	871	70	48%
2014	147	1,263	120	723	63	42%
2015	139	1,402	125	1,010	61	43%
2016	130	1,532	140	747	44	33%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Neonatal ECPR Support Mode



Neonatal ECPR Support Mode Details

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
VA	1,515	129	1,082	620	40%
VV	13	120	447	7	53%
Other	4	104	198	3	75%
Unknown	4	101	121	1	25%
VVA	1	118	118	0	0%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

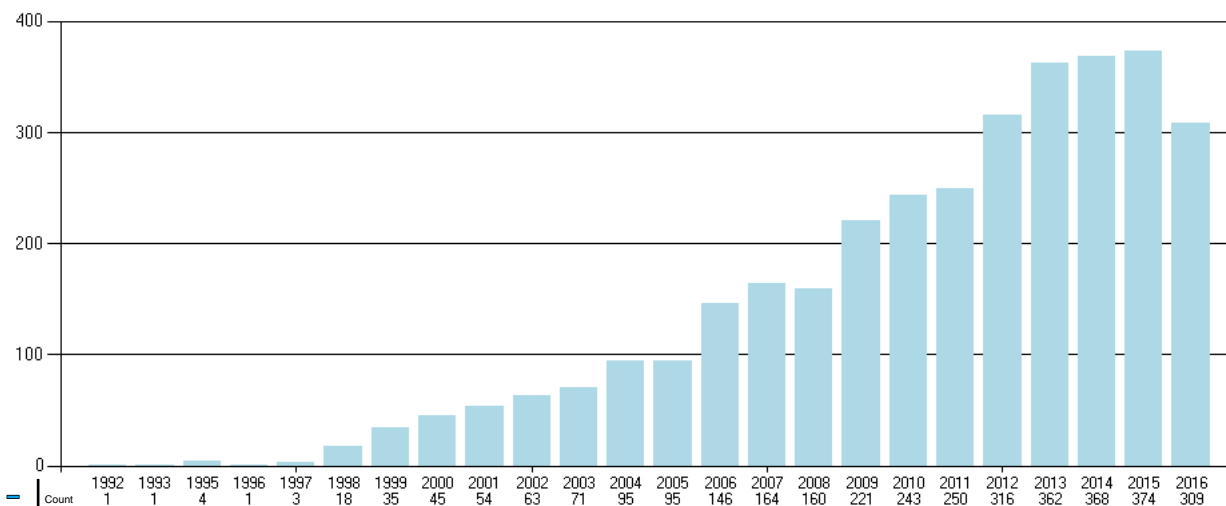
Neonatal ECPR Complications

	<i>No. Reported</i>	<i>% Reported</i>	<i>No. Survived</i>	<i>% Survived</i>
Mechanical: Oxygenator failure	87	5.7%	23	26%
Mechanical: Raceway rupture	3	0.2%	0	0%
Mechanical: Other tubing rupture	8	0.5%	3	38%
Mechanical: Pump malfunction	24	1.6%	7	29%
Mechanical: Heat exchanger malfunction	2	0.1%	0	0%
Mechanical: Clots: oxygenator	156	10.2%	57	37%
Mechanical: Clots: bridge	32	2.1%	10	31%
Mechanical: Clots: bladder	55	3.6%	23	42%
Mechanical: Clots: hemofilter	60	3.9%	18	30%
Mechanical: Clots: other	219	14.3%	86	39%
Mechanical: Air in circuit	79	5.2%	24	30%
Mechanical: Cracks in pigtail connectors	5	0.3%	2	40%
Mechanical: Cannula problems	110	7.2%	33	30%
Hemorrhagic: GI hemorrhage	21	1.4%	3	14%
Hemorrhagic: Cannulation site bleeding	187	12.2%	64	34%
Hemorrhagic: Surgical site bleeding	270	17.6%	79	29%
Hemorrhagic: Hemolysis (hgb > 50 mg/dl)	214	14%	54	25%

Hemorrhagic: Disseminated intravascular coagulation (DIC)	73	4.8%	13	18%
Neurologic: Brain death clinically determined	29	1.9%	0	0%
Neurologic: Seizures: clinically determined	114	7.4%	46	40%
Neurologic: Seizures: EEG determined	89	5.8%	18	20%
Neurologic: CNS infarction by US/CT	81	5.3%	18	22%
Neurologic: CNS hemorrhage by US/CT	225	14.7%	58	26%
Renal: Creatinine 1.5 - 3.0	127	8.3%	33	26%
Renal: Creatinine > 3.0	45	2.9%	17	38%
Renal: Dialysis required	54	3.5%	11	20%
Renal: Hemofiltration required	451	29.4%	152	34%
Renal: CAVHD required	98	6.4%	18	18%
Cardiovascular: Inotropes on ECLS	831	54.2%	299	36%
Cardiovascular: CPR required	61	4%	14	23%
Cardiovascular: Myocardial stun by echo	93	6.1%	28	30%
Cardiovascular: Cardiac arrhythmia	174	11.4%	50	29%
Cardiovascular: Hypertension requiring vasodilators	193	12.6%	79	41%
Cardiovascular: PDA: R->L	9	0.6%	4	44%
Cardiovascular: PDA: L->R	20	1.3%	7	35%
Cardiovascular: PDA: bidirectional	14	0.9%	6	43%
Cardiovascular: PDA: unknown	1	0.1%	0	0%
Cardiovascular: Tamponade: blood	49	3.2%	16	33%
Cardiovascular: Tamponade: serous	6	0.4%	1	17%
Cardiovascular: Tamponade: air	1	0.1%	1	100%
Pulmonary: Pneumothorax requiring treatment	41	2.7%	13	32%
Pulmonary: Pulmonary hemorrhage	72	4.7%	14	19%
Infectious: Culture proven infection (see Infections)	106	6.9%	32	30%
Infectious: WBC < 1,500	20	1.3%	3	15%
Metabolic: Glucose < 40	38	2.5%	12	32%
Metabolic: Glucose > 240	269	17.6%	101	38%
Metabolic: pH < 7.20	165	10.8%	36	22%
Metabolic: pH > 7.60	72	4.7%	32	44%
Metabolic: Hyperbilirubinemia (> 2 direct or > 15 total)	113	7.4%	41	36%
Limb: Ischemia	7	0.5%	1	14%

Pediatric ECPR (>28 days and <18 years)

Annual ECPR Pediatric Runs

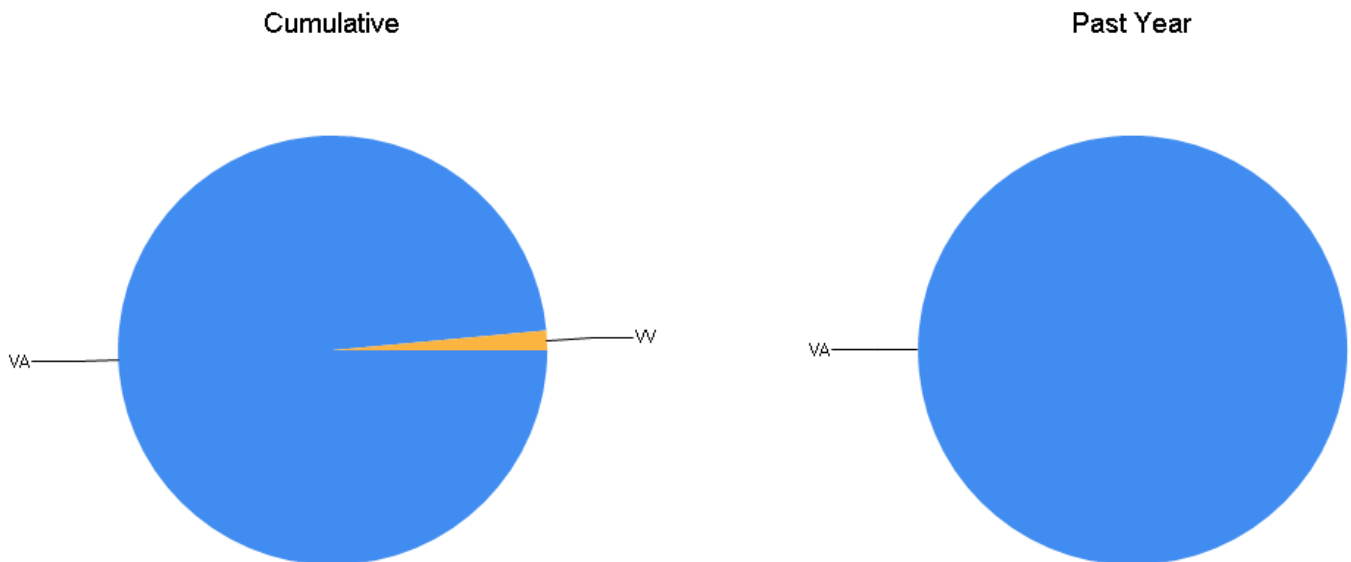


Pediatric ECPR Runs by Year

<i>Annual Runs</i>	<i>Cumulative Runs</i>	<i>Average Run Time</i>	<i>Longest Run Time</i>	<i>No. Survived</i>	<i>% Survived</i>
1992	1	180	180	0	0%
1993	2	137	137	0	0%
1995	6	130	320	1	25%
1996	7	24	24	0	0%
1997	10	23	43	0	0%
1998	28	90	500	4	22%
1999	63	87	380	17	48%
2000	108	108	720	19	42%
2001	162	109	457	15	27%
2002	225	149	916	29	46%
2003	296	97	535	32	45%
2004	391	126	832	38	40%
2005	486	121	751	32	33%
2006	632	106	719	57	39%
2007	796	119	736	69	42%
2008	956	108	751	61	38%
2009	1,177	122	1,410	86	38%
2010	1,420	118	645	104	42%
2011	1,670	113	944	118	47%
2012	1,986	137	4,755	140	44%
2013	2,348	134	2,320	154	42%
2014	2,716	124	1,427	167	45%
2015	3,090	119	1,203	147	39%
2016	3,399	121	1,247	124	40%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Pediatric ECPR Support Mode



Pediatric ECPR Support Mode Details

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
VA	3,329	120	4,755	1,381	41%
VV	50	171	968	22	44%
Other	24	219	858	13	54%
Unknown	12	138	223	5	41%
VVA	9	147	599	3	33%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

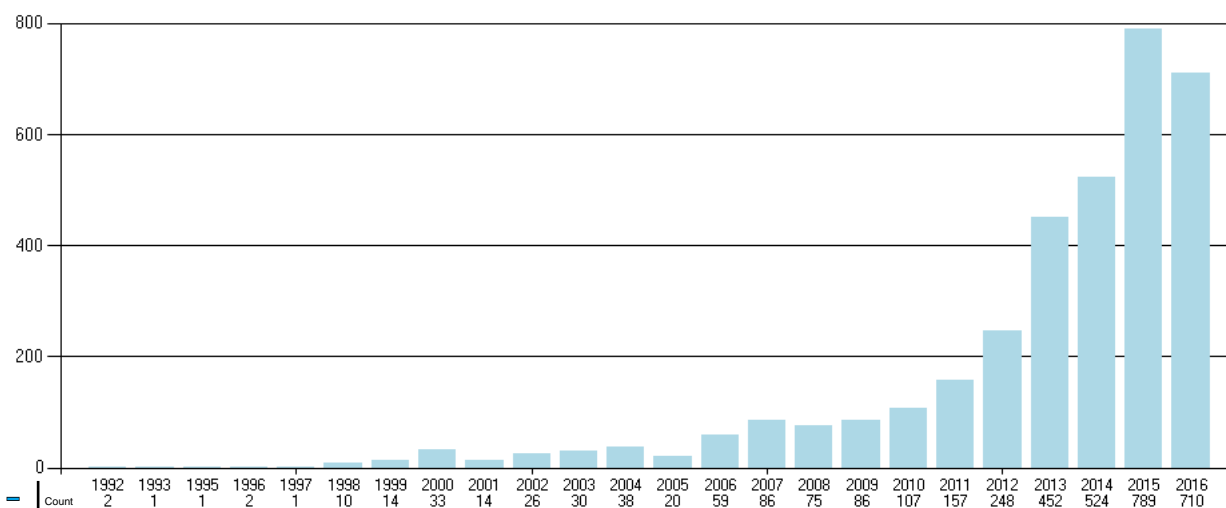
Pediatric ECPR Complications

	<i>No. Reported</i>	<i>% Reported</i>	<i>No. Survived</i>	<i>% Survived</i>
Mechanical: Oxygenator failure	159	4.7%	57	36%
Mechanical: Raceway rupture	5	0.1%	2	40%
Mechanical: Other tubing rupture	8	0.2%	4	50%
Mechanical: Pump malfunction	30	0.9%	10	33%
Mechanical: Heat exchanger malfunction	5	0.1%	1	20%
Mechanical: Clots: oxygenator	235	6.9%	108	46%
Mechanical: Clots: bridge	54	1.6%	24	44%
Mechanical: Clots: bladder	61	1.8%	23	38%
Mechanical: Clots: hemofilter	73	2.1%	29	40%
Mechanical: Clots: other	313	9.2%	156	50%
Mechanical: Air in circuit	101	3%	35	35%
Mechanical: Cracks in pigtail connectors	18	0.5%	8	44%
Mechanical: Cannula problems	283	8.3%	90	32%
Hemorrhagic: GI hemorrhage	99	2.9%	12	12%
Hemorrhagic: Cannulation site bleeding	660	19.4%	257	39%
Hemorrhagic: Surgical site bleeding	495	14.6%	205	41%
Hemorrhagic: Hemolysis (hgb > 50 mg/dl)	270	7.9%	92	34%

Hemorrhagic: Disseminated intravascular coagulation (DIC)	221	6.5%	26	12%
Neurologic: Brain death clinically determined	371	10.9%	0	0%
Neurologic: Seizures: clinically determined	292	8.6%	97	33%
Neurologic: Seizures: EEG determined	210	6.2%	74	35%
Neurologic: CNS infarction by US/CT	359	10.6%	93	26%
Neurologic: CNS hemorrhage by US/CT	273	8%	65	24%
Renal: Creatinine 1.5 - 3.0	316	9.3%	85	27%
Renal: Creatinine > 3.0	136	4%	43	32%
Renal: Dialysis required	122	3.6%	32	26%
Renal: Hemofiltration required	766	22.5%	287	37%
Renal: CAVHD required	265	7.8%	74	28%
Cardiovascular: Inotropes on ECLS	1,735	51%	641	37%
Cardiovascular: CPR required	200	5.9%	35	18%
Cardiovascular: Myocardial stun by echo	194	5.7%	64	33%
Cardiovascular: Cardiac arrhythmia	462	13.6%	184	40%
Cardiovascular: Hypertension requiring vasodilators	494	14.5%	253	51%
Cardiovascular: PDA: R->L	1	0%	0	0%
Cardiovascular: PDA: L->R	13	0.4%	4	31%
Cardiovascular: PDA: bidirectional	3	0.1%	3	100%
Cardiovascular: Tamponade: blood	102	3%	42	41%
Cardiovascular: Tamponade: serous	17	0.5%	7	41%
Cardiovascular: Tamponade: air	2	0.1%	0	0%
Pulmonary: Pneumothorax requiring treatment	82	2.4%	23	28%
Pulmonary: Pulmonary hemorrhage	290	8.5%	59	20%
Infectious: Culture proven infection (see Infections)	276	8.1%	115	42%
Infectious: WBC < 1,500	50	1.5%	13	26%
Metabolic: Glucose < 40	90	2.6%	24	27%
Metabolic: Glucose > 240	522	15.4%	176	34%
Metabolic: pH < 7.20	472	13.9%	102	22%
Metabolic: pH > 7.60	104	3.1%	45	43%
Metabolic: Hyperbilirubinemia (> 2 direct or > 15 total)	180	5.3%	53	29%
Limb: Ischemia	22	0.6%	7	32%
Limb: Compartment Syndrome	11	0.3%	5	45%
Limb: Fasciotomy	9	0.3%	8	89%
Limb: Amputation	6	0.2%	3	50%

Adult ECPR (18 years and over)

Annual ECPR Adult Runs

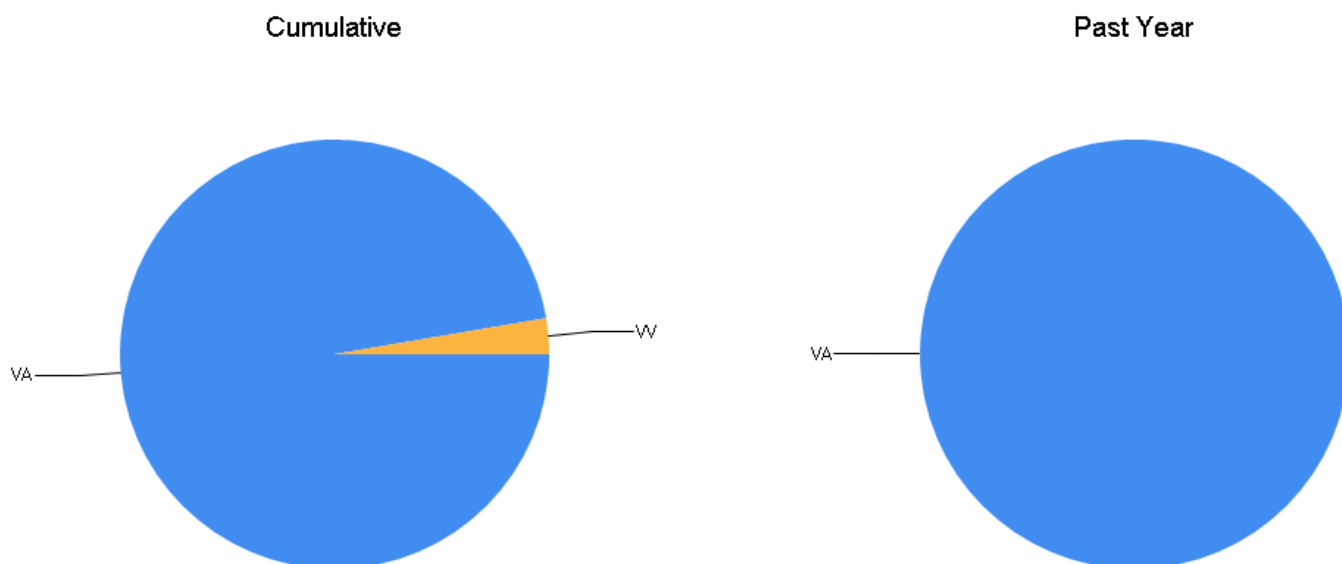


Adult ECPR Runs by Year

	<i>Annual Runs</i>	<i>Cumulative Runs</i>	<i>Average Run Time</i>	<i>Longest Run Time</i>	<i>No. Survived</i>	<i>% Survived</i>
1992	2	2	11	22	1	50%
1993	1	3	2	2	0	0%
1995	1	4	1	1	0	0%
1996	2	6	69	71	1	50%
1997	1	7	70	70	0	0%
1998	10	17	61	167	4	40%
1999	14	31	79	215	1	7%
2000	33	64	71	335	11	33%
2001	14	78	113	273	8	57%
2002	26	104	62	197	7	26%
2003	30	134	91	302	16	53%
2004	38	172	118	842	7	18%
2005	20	192	95	261	8	40%
2006	59	251	83	1,421	8	13%
2007	86	337	108	627	21	24%
2008	75	412	76	459	22	29%
2009	86	498	78	833	26	30%
2010	107	605	102	893	35	32%
2011	157	762	108	2,209	41	26%
2012	248	1,010	106	718	63	25%
2013	452	1,462	105	995	143	31%
2014	524	1,986	103	1,481	167	31%
2015	789	2,775	103	1,513	234	29%
2016	710	3,485	110	1,567	169	23%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Adult ECPR Support Mode



Adult ECPR Support Mode Details

	<i>Total Runs</i>	<i>Avg Run Time</i>	<i>Longest Run Time</i>	<i>Survived</i>	<i>% Survived</i>
VA	3,358	102	2,209	957	28%
VV	93	154	1,175	34	36%
Unknown	43	101	899	8	18%
VVA	23	98	467	4	17%
Other	12	148	572	5	41%

Run time in hours. Survived = survival to discharge or transfer based on number of runs

Adult ECPR Complications

	<i>No. Reported</i>	<i>% Reported</i>	<i>No. Survived</i>	<i>% Survived</i>
Mechanical: Oxygenator failure	245	7%	64	26%
Mechanical: Raceway rupture	2	0.1%	0	0%
Mechanical: Other tubing rupture	10	0.3%	4	40%
Mechanical: Pump malfunction	20	0.6%	4	20%
Mechanical: Heat exchanger malfunction	1	0%	0	0%
Mechanical: Clots: oxygenator	233	6.7%	62	27%
Mechanical: Clots: bridge	9	0.3%	3	33%
Mechanical: Clots: hemofilter	68	2%	16	24%
Mechanical: Clots: other	137	3.9%	38	28%
Mechanical: Air in circuit	49	1.4%	8	16%
Mechanical: Cracks in pigtail connectors	18	0.5%	1	6%
Mechanical: Cannula problems	167	4.8%	29	17%
Hemorrhagic: GI hemorrhage	184	5.3%	27	15%
Hemorrhagic: Cannulation site bleeding	582	16.7%	177	30%
Hemorrhagic: Surgical site bleeding	365	10.5%	99	27%
Hemorrhagic: Hemolysis (hgb > 50 mg/dl)	174	5%	41	24%
Hemorrhagic: Disseminated intravascular coagulation (DIC)	137	3.9%	16	12%

Neurologic: Brain death clinically determined	372	10.7%	0	0%
Neurologic: Seizures: clinically determined	79	2.3%	17	22%
Neurologic: Seizures: EEG determined	50	1.4%	10	20%
Neurologic: CNS infarction by US/CT	203	5.8%	36	18%
Neurologic: CNS hemorrhage by US/CT	97	2.8%	10	10%
Renal: Creatinine 1.5 - 3.0	689	19.8%	189	27%
Renal: Creatinine > 3.0	434	12.5%	124	29%
Renal: Dialysis required	350	10%	89	25%
Renal: Hemofiltration required	444	12.7%	114	26%
Renal: CAVHD required	378	10.8%	81	21%
Cardiovascular: Inotropes on ECLS	1,823	52.3%	500	27%
Cardiovascular: CPR required	321	9.2%	46	14%
Cardiovascular: Myocardial stun by echo	272	7.8%	63	23%
Cardiovascular: Cardiac arrhythmia	602	17.3%	143	24%
Cardiovascular: Hypertension requiring vasodilators	100	2.9%	54	54%
Cardiovascular: Tamponade: blood	98	2.8%	19	19%
Cardiovascular: Tamponade: serous	5	0.1%	1	20%
Pulmonary: Pneumothorax requiring treatment	67	1.9%	10	15%
Pulmonary: Pulmonary hemorrhage	116	3.3%	12	10%
Infectious: Culture proven infection (see Infections)	399	11.4%	132	33%
Infectious: WBC < 1,500	34	1%	4	12%
Metabolic: Glucose < 40	50	1.4%	4	8%
Metabolic: Glucose > 240	626	18%	182	29%
Metabolic: pH < 7.20	589	16.9%	90	15%
Metabolic: pH > 7.60	131	3.8%	46	35%
Metabolic: Hyperbilirubinemia (> 2 direct or > 15 total)	241	6.9%	51	21%
Limb: Ischemia	142	4.1%	35	25%
Limb: Compartment Syndrome	32	0.9%	12	38%
Limb: Fasciotomy	41	1.2%	15	37%
Limb: Amputation	14	0.4%	5	36%