

The USAT Experience

TRIATHLON FATALITIES

LAWRENCE L. CRESWELL, MD



Lawrence L. Creswell, MD

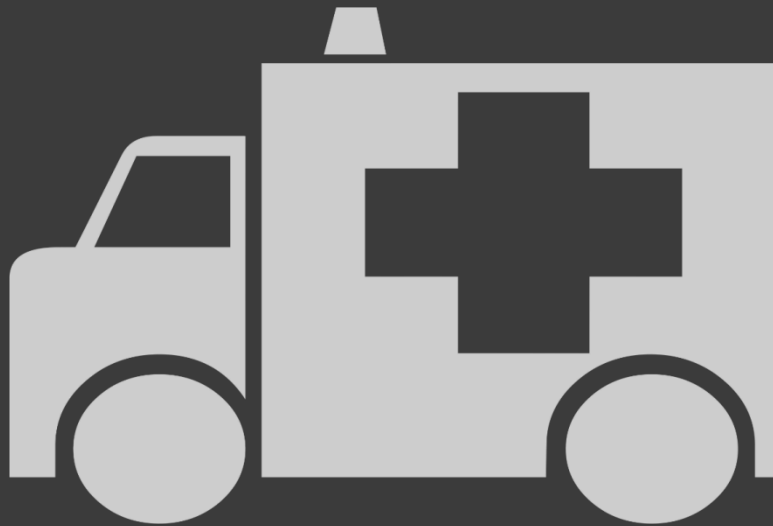
- Heart Surgeon,
University of
Mississippi
- Triathlete
- USAT Medical
Review Panel





Image, MarioCantu/CIMAGES. *USAT Multisport Zone*, Oct., 2014.

Race-Related Medical Problems



- Injuries
- Minor medical problems
- Serious medical problems
- Fatalities

Media Attention

Ross Ehlinger Identified as Alcatraz Triathlete Who Died During Race

By Erin Sherbert

[click to enlarge](#)



S.F. EXAMINER FILE PHOTO

Ross Ehlinger of Austin, Texas died during Escape From Alcatraz triathlon

The San Francisco Medical Examiner's Office this morning said it was 46-year-old Ross Ehlinger who died on Sunday during the city's popular [Escape From Alcatraz](#) triathlon, marking the first death in the history of the annual event.

SF Weekly reports that the [Austin](#) resident died less than a minute after he jumped into the chilly water; he was pulled from the Bay immediately and paramedics performed CPR, but were unable to revive him.

San Francisco Examiner
Escape From Alcatraz Triathlon,
March 3, 2013

Media Attention



Trouble Beneath The Surface

Once the quirky domain of super athletes, triathlons have hit the mainstream and brought along an increasing number of deaths. What's happening? There are no simple answers.

Outside the Lines

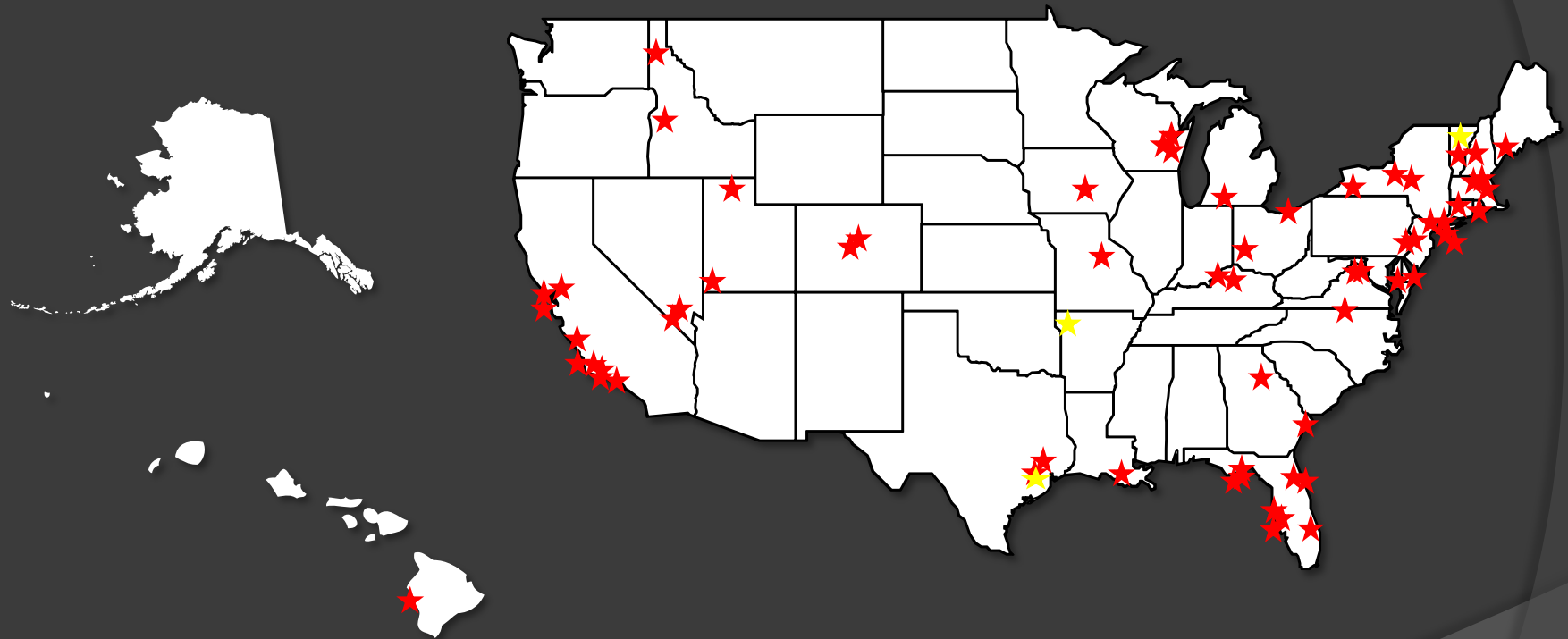
by Bonnie D. Ford

10/18/13

ESPN, October 18, 2013

Outside the Lines, T.J. Quinn and Bonnie Ford

Fatality Locations



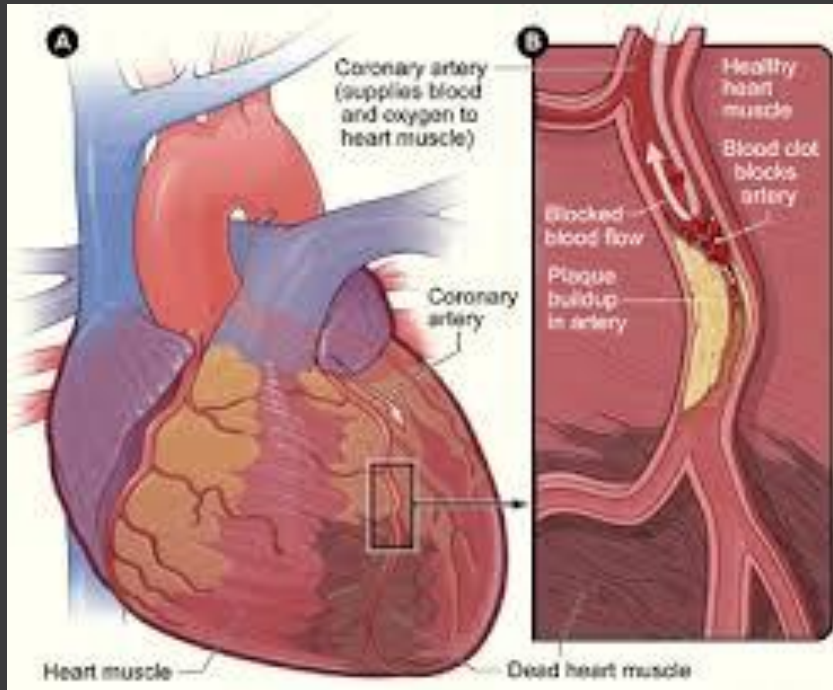
2003-2013

Audience Poll

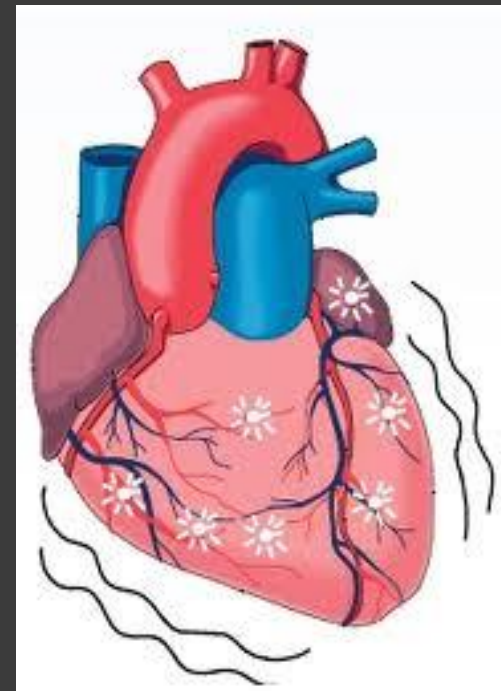
⦿ Have/do you....

- Been at a race with a fatality?
- Know an athlete who died at a race?
- Raced at venue with previous fatality?
- Been involved organizationally with a fatality?

Background: Sudden Cardiac Death (SCD)



Heart Attack



**Cardiac Arrest →
Sudden Cardiac Death (SCD)**

SCD in Running Races

Marathon, Half-Marathon
2000-2010
10.9 million runners

- 59 victims of SCA
- Marathon: ~1 per 100,000
- Half-Marathon: ~1 per 300,000
- Male >> Female
- Survival rate: 29%
 - Better if recent MD visit
- Autopsy: Abnormal heart in majority
- Deaths in final miles



Theory: Surge at finish,
mismatched blood/oxygen
supply/demand.

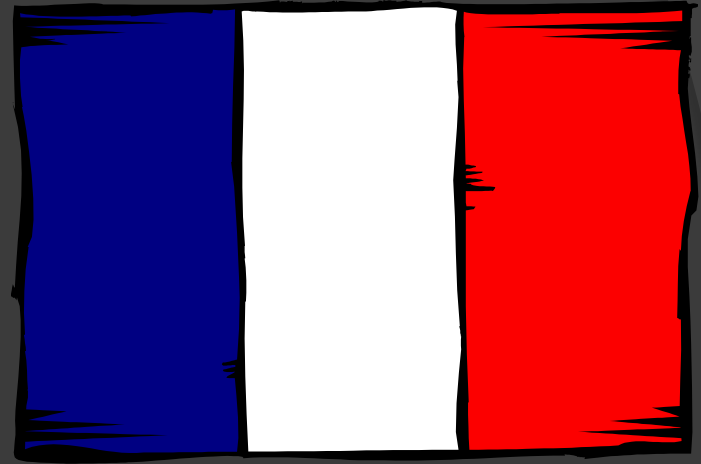
SCD in College Athletes

- 2004-2008
- 1,969,663 athlete participation-years
- SCD in 1 per 43,770 athletes per year
 - Basketball 1 per 11,394
 - Swimming 1 per 21,293
 - Lacrosse 1 per 23,357
 - Football 1 per 38,497
 - Cross-country 1 per 41,695

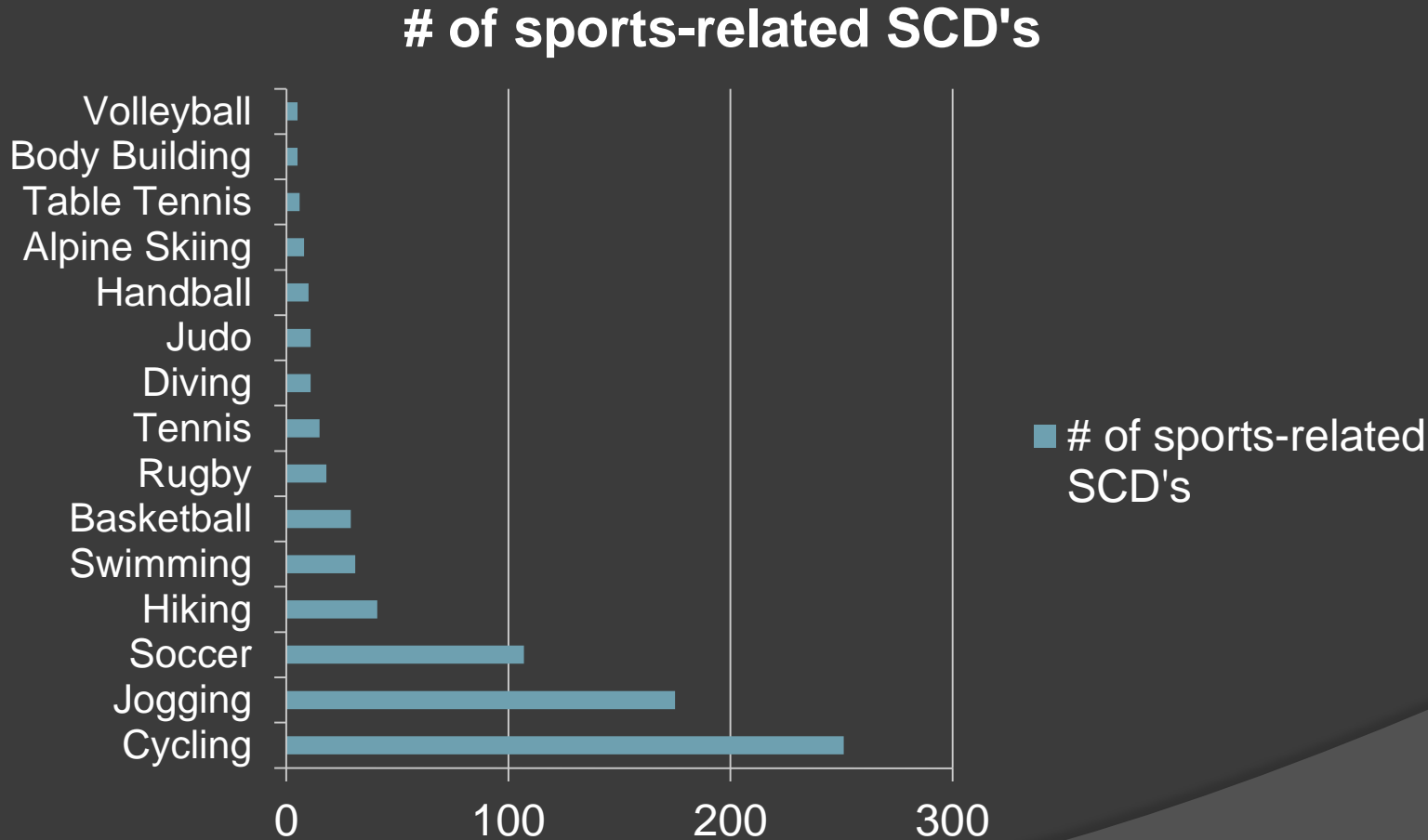


Sports-Related SCD in General Population

- 2005-2010
- Overall, 4.6 cases of SCD per million per year
 - Age range: 11 to 75 years (average, 46 years)
 - 6% in young, competitive athletes
 - >90% in context of recreational sports



Sports-Related SCD in General Population



Marijon, et al. Circulation, 2011;124:672-681.

Sports-Related SCD in General Population

◎ Implications for USA

- Rate of SCD is probably underestimated
 - No organized reporting mechanism
- ~4250 cases per year in USA
- ~1700 cases per year in Japan



Triathlon Fatalities

- ⦿ What do we know?
- ⦿ How do we know it?
 - Media accounts
 - Brief scientific report, 2010
 - USA Triathlon (USAT) review, 2012
 - **Fatality Incidents Study**

A Scientific Report

A Scientific Report: Focus on SCD

- ◉ Kevin M. Harris, MD
 - Minneapolis Heart Institute
- ◉ ACC Meeting, 2009
- ◉ Research Letter, JAMA, 2010



RESEARCH LETTER

Sudden Death During the Triathlon

To the Editor: Triathlon is among the most vigorous amateur athletic disciplines, requiring expertise in swimming, biking, and running.¹⁻³ Although sudden death risk has been

(Reprinted) JAMA, April 7, 2010—Vol 303, No. 13 **1255**



The screenshot shows the Boston.com website interface. At the top, there's a search bar with 'Local Search' and 'Site Search' options, and a 'GO' button. To the right, there's a 'Sign In | Register now' link. Below the search bar, there's a navigation menu with links for HOME, TODAY'S GLOBE, NEWS, BUSINESS, SPORTS, LIFESTYLE, A&E, and TH. Underneath this, there's a secondary menu with links for Local, National, World, Politics, Business, Education, Health, Science, and Green. The main content area features a headline 'Study: Triathlons can pose deadly heart risks' by Marilyn Marchione, dated March 28, 2009. The article text begins with 'ORLANDO, Fla.—Warning to weekend warriors: Swim-bike-run triathlons pose at least twice the risk of sudden death as marathons do, the first study of these competitions has found.' and continues with 'The risk is mostly from heart problems during the swimming part. And while that risk is low -- about 15 out of a million participants -- it's not inconsequential, the study's author says.'

SCD in Triathlon: Harris et al.

⦿ JAMA Letter, April, 2010

- 2006-2008
- 959,214 participants
- Triathlon
- 14 deaths
 - 13 swim, 1 bike
 - 11 men, 3 women
 - 6 sprint, 4 intermediate, 4 long-distance
- SCD rate = 1.5 per 100,000 participants
 - **Comparison:** Marathon, 0.8 per 100,000 runners

SCD in Triathlon: Harris et al.

⦿ Autopsy information

- 14 deaths
- 9 autopsy reports from swimming victims
 - All “accidental drowning” as cause of death
 - 2 normal hearts
 - 7 abnormal hearts
 - 5 with abnormal hypertrophy
 - 1 with WPW syndrome
 - 1 with coronary artery anomaly

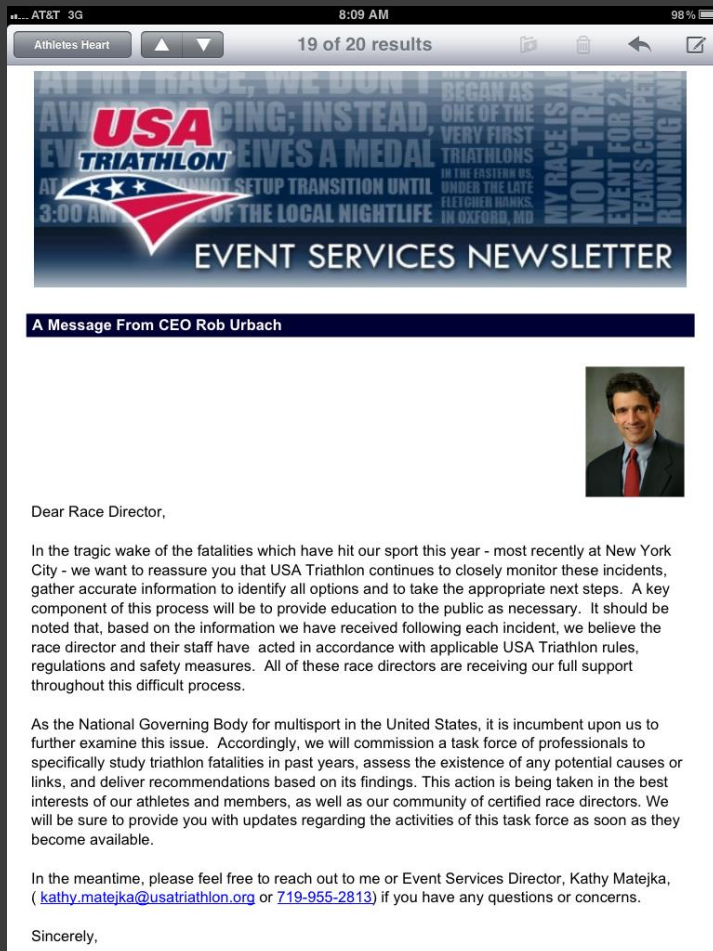
SCD in Triathlon: Harris et al.

⦿ Conclusions

- “Although mass screening before competition may be impractical, awareness of cardiovascular risks may motivate athletes to seek preparticipation evaluations on an individual basis.”
- “Efforts to improve triathlon safety could include establishing minimum achievement standards for participation, including swimming proficiency.”

USAT Review

USAT Review



- USA Triathlon announces Medical Review Panel
- August, 2011

USAT Medical Review Panel



Bill Burnett



Stuart Weiss, MD



Richard Miller, MD

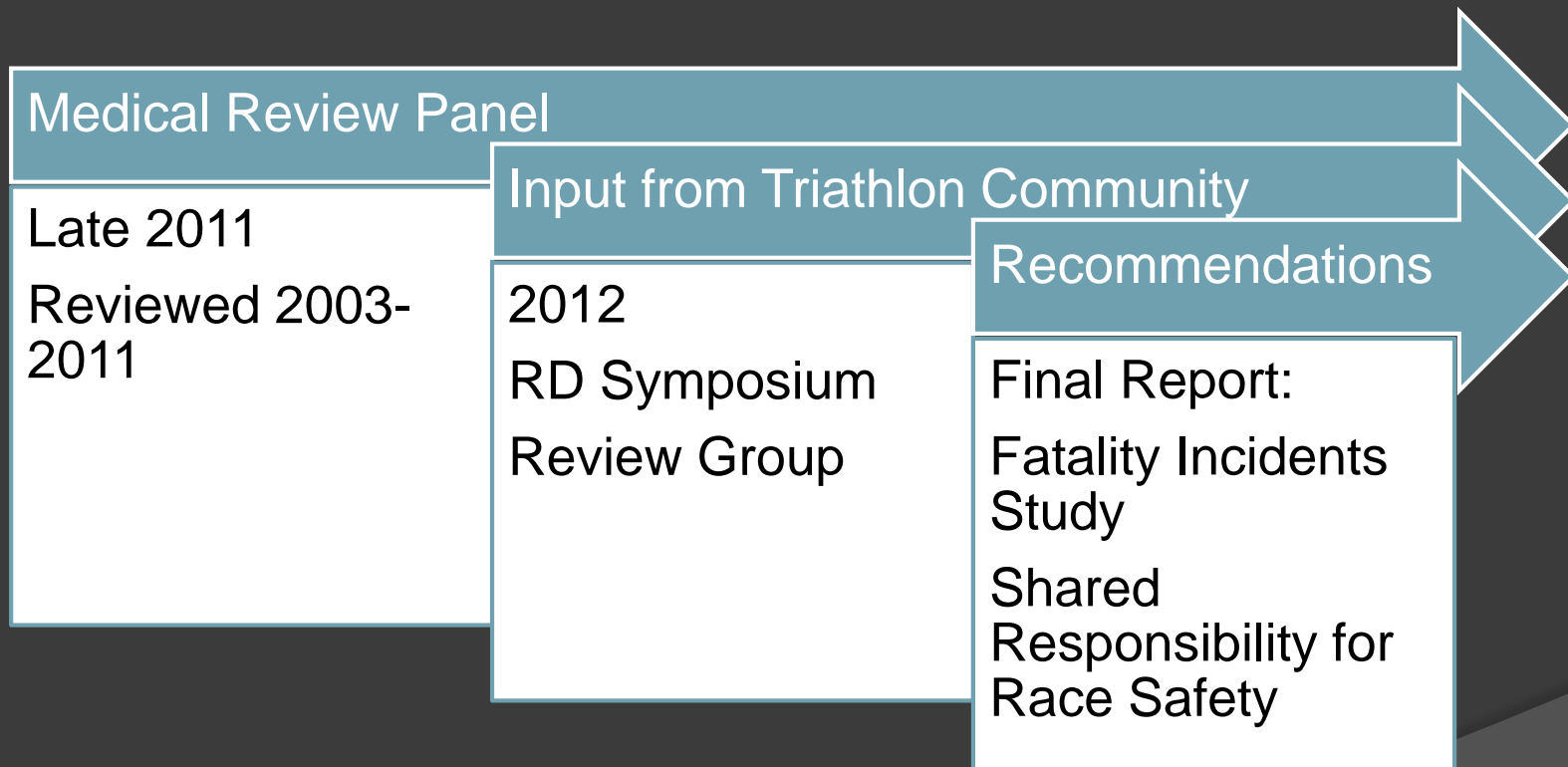


Larry Creswell, MD

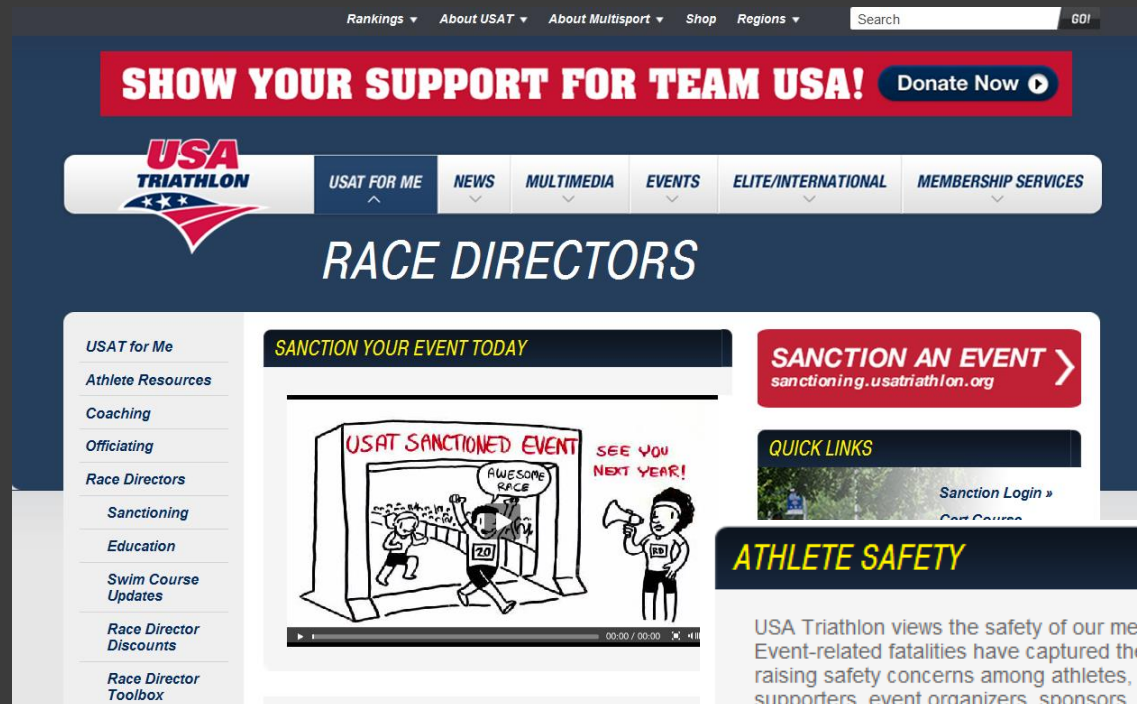


Robert Vigorito

USAT Review



USAT Fatality Incidents Study



www.usatriathlon.org

ATHLETE SAFETY

USA Triathlon views the safety of our members as a core imperative. Event-related fatalities have captured the attention of our community, raising safety concerns among athletes, family members and other supporters, event organizers, sponsors, community leaders, and the medical community. We have conducted a careful review of the collective experience with fatalities at USA Triathlon-sanctioned events from 2003 through 2011. Our objectives were to attempt to bring clarity, identify potential patterns and underlying causes, and investigate opportunities to make any future improvements in event safety.

Click here to view a PDF file of the USA Triathlon Fatality Incidents Study.

USAT Review

Information Reviewed

Athletes

- Age
- Gender
- Event, date, format, length
- Brief narrative

USAT membership, participation

Sanction requirements

Press accounts

Information **Not** Reviewed

Athletes

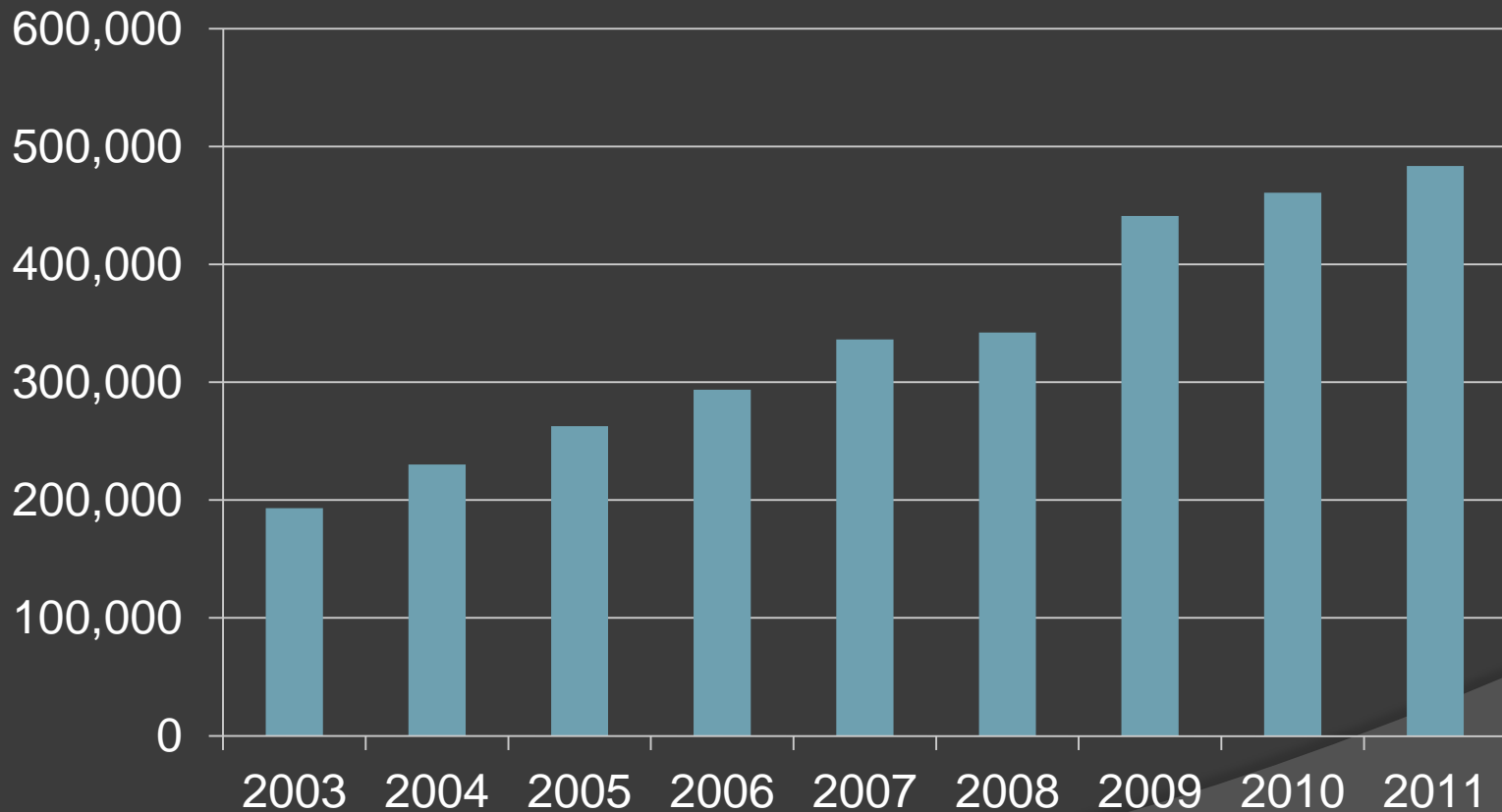
- Medical history
- Treatments
- Autopsy
- Experience, ability

Events

- Safety plan
- Water temp
- Water conditions

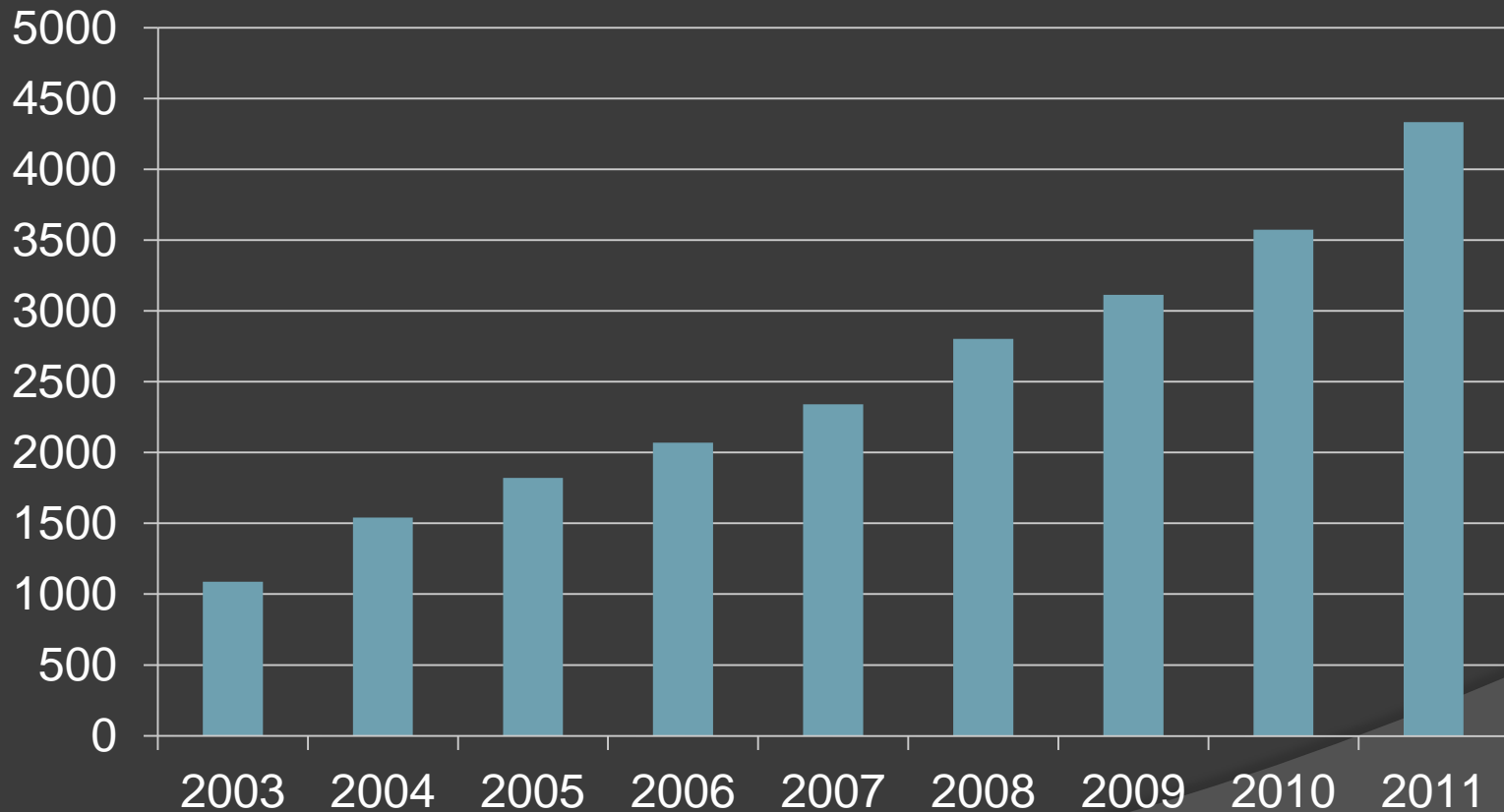
USAT Review: Increasing Participation














































USAT Member Counts (Annual plus 1-Day)



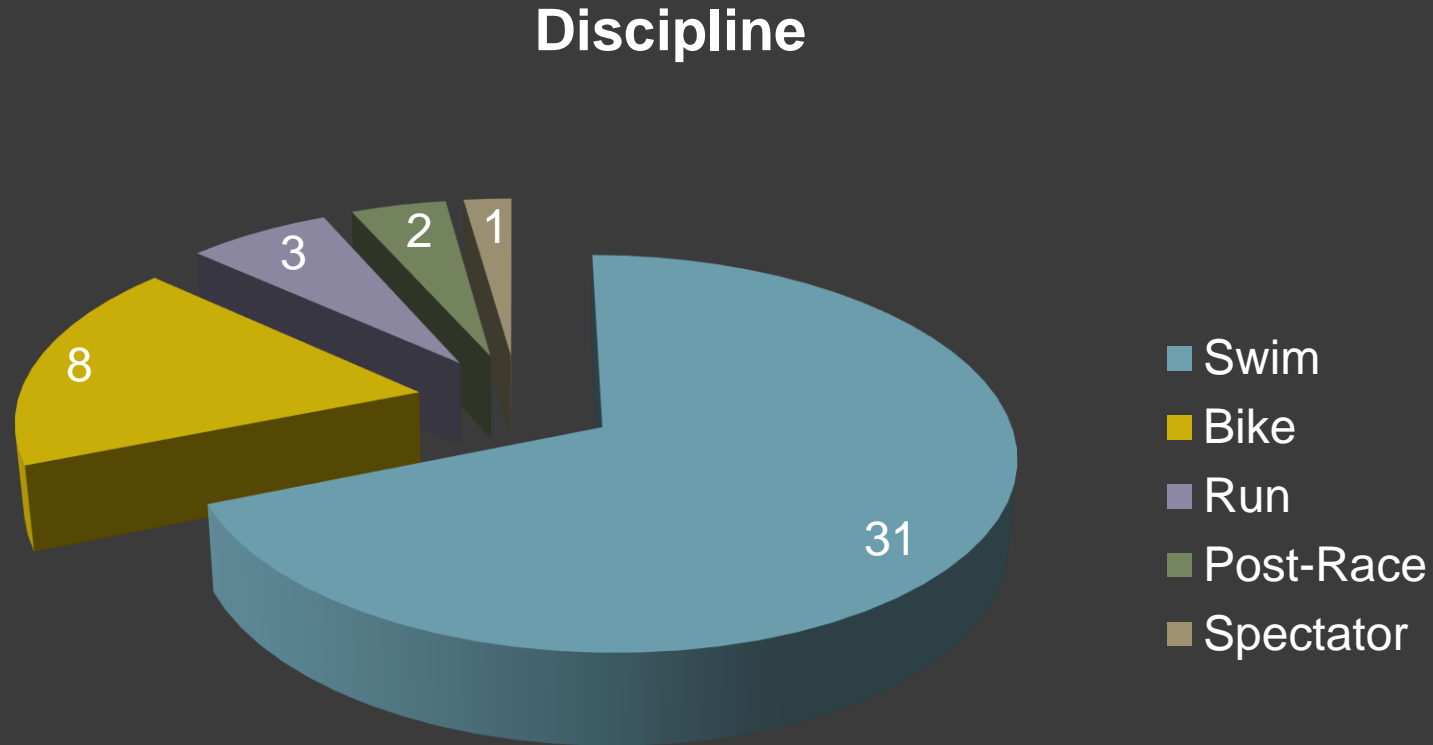
USAT Review: Increasing Participation

USAT-Sanctioned Events

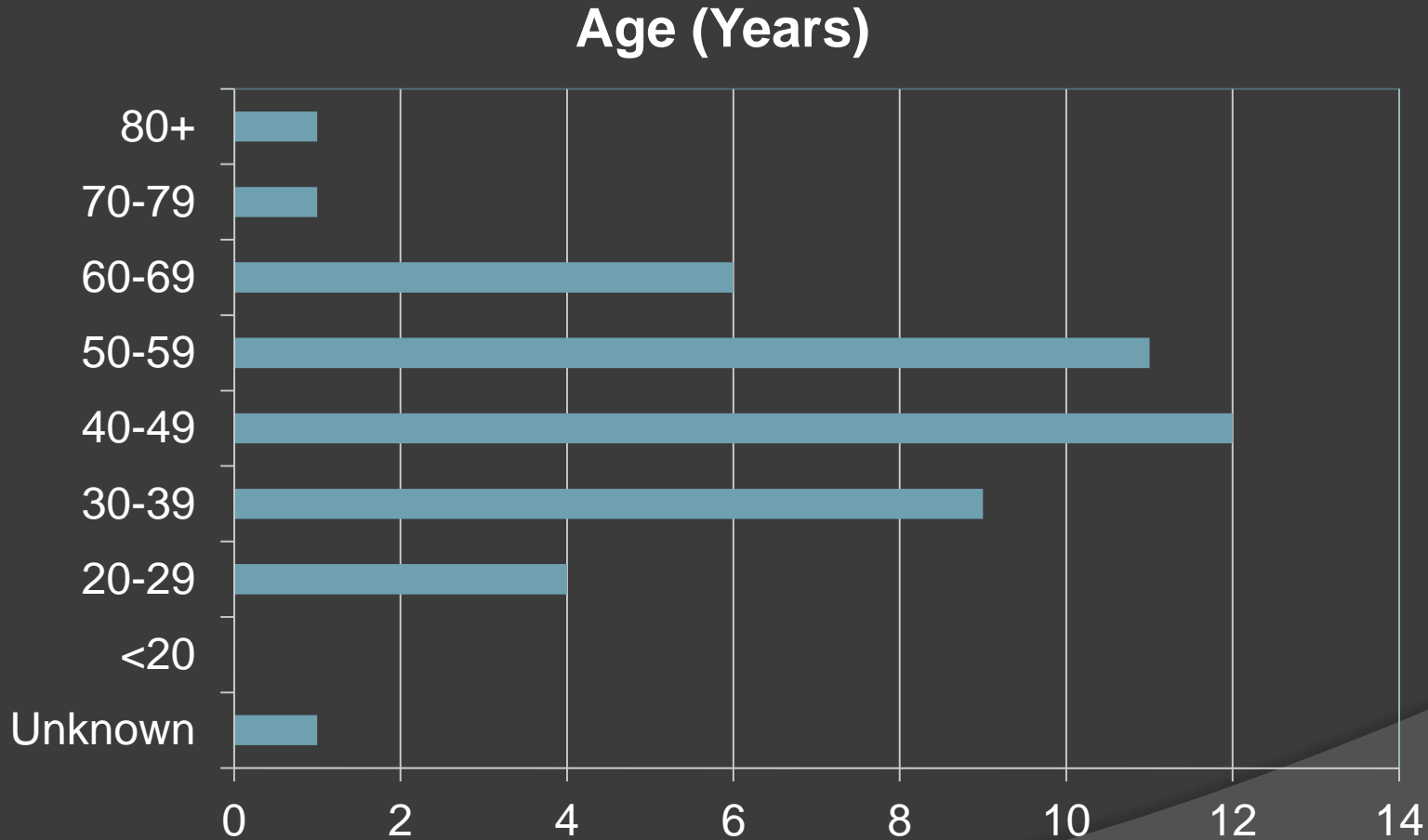


Year	Number of Fatalities	Type of Fatalities
2003	1	
2004	2	 
2005	7	      
2006	3	  
2007	6	     
2008	8	       
2009	3	  
2010	3	  
2011	12	           
Total	45	

Fatalities by Discipline

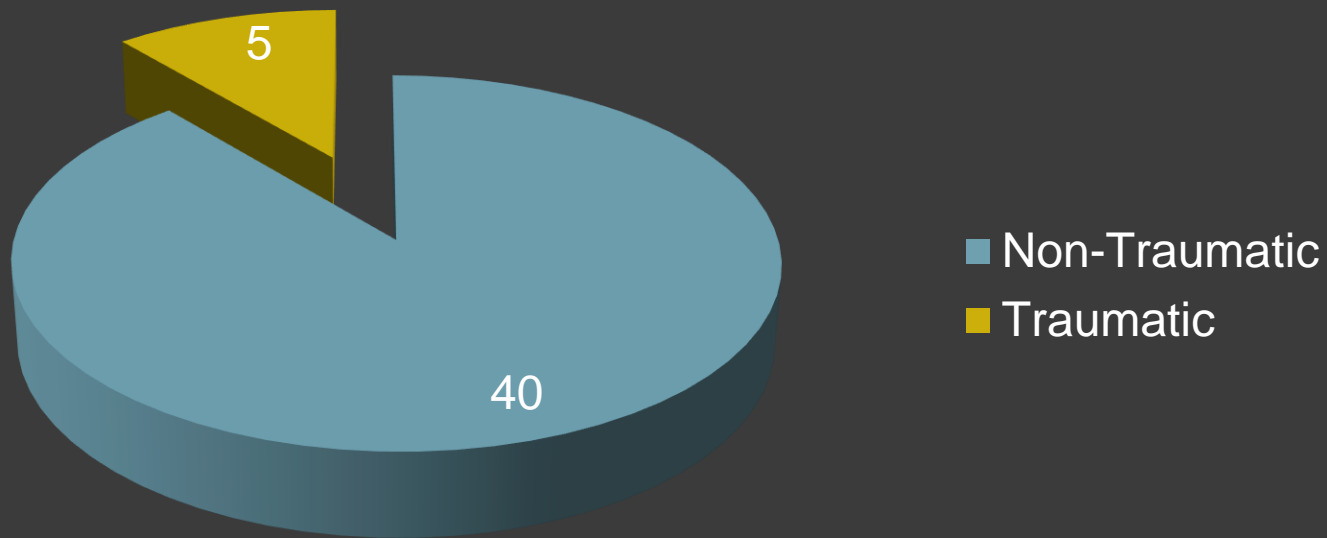


Fatalities by Athlete Age



Fatalities by Type

Type of Fatality



Overall Race-Related Fatality Rates

Year	Approximate Fatality Rate
2003	N/A*
2004	N/A*
2005	N/A*
2006	1 per 92,000
2007	1 per 57,000
2008	1 per 45,000
2009	1 per 159,000
2010	1 per 173,000
2011	1 per 54,000
Average 2006-2011	1 per 76,000

USAT Review: Key Findings

- ◎ Relationship to race length, venue, swim design
 - Fatality rate **not** related to race length
 - Fatality rate **not** related to type of swim venue
 - Fatality rate **not** related to swim start method

USAT Review: Key Findings

⦿ Athlete experience

- Wide range of triathlon experience
- Problem **not** confined to inexperienced athletes

USAT Review: Key Findings

⦿ Cause of death during swim

- No evidence for:
 - Poor swimming ability
 - Typical drowning
 - Anxiety/panic
 - Wetsuit-related factors
 - Lack of warm-up
 - Unusual medical problems: stroke, seizure, syncope, SIPE, pulmonary embolism, trauma

USAT Review: Shared Responsibility for Race Safety

Athlete



Show up for the race healthy, fit, and prepared

Event Organizers



Design, plan, and conduct the event with athlete safety as a foremost priority

USAT



Provide tools, resources, education, oversight, and monitoring

USAT Review: Shared Responsibility for Race Safety

Reducing Triathlon-Related Fatalities: Shared Responsibility

Athletes	Event Organizers	USA Triathlon
Responsibility: Show up for the race healthy, fit, and prepared.	Responsibility: Design, plan, and conduct the event with athlete safety as a foremost priority.	Responsibility: Provide tools, resources, education, oversight, and monitoring.
<ul style="list-style-type: none"><input type="checkbox"/> Visit your doctor for a physical examination with an emphasis on heart health before participating. Unrecognized heart problems are the primary cause of sports-related sudden cardiac death.<input type="checkbox"/> Consult with your doctor about any warning signs during training such as chest pain/discomfort, shortness	<ul style="list-style-type: none"><input type="checkbox"/> The approved safety plan should account for unique features of an event's location, weather and participants.<input type="checkbox"/> The safety plan should pay particular attention to the possibilities of bike crashes with serious, life-threatening injuries; and sudden cardiac death at any point	<ul style="list-style-type: none"><input type="checkbox"/> Provide education about race-related fatalities, causes, and potential solutions in curricula for coaches, race directors, and officials during respective certification courses and the annual USA Triathlon Race Director Symposium.<input type="checkbox"/> Distribute information about the

Shared Responsibility: **Athletes**

- ⦿ Visit your doctor
- ⦿ Warning signs
- ⦿ Select an appropriate race based on health, fitness
- ⦿ Appropriate race plan
- ⦿ Choose a safe race
- ⦿ Practice open water swimming
- ⦿ Review race info
- ⦿ Check your equipment
- ⦿ During race, stop at 1st sign of medical problem
- ⦿ Tend to fellow athletes
- ⦿ Learn CPR

Shared Responsibility: Event Organizers

- ⦿ Unique event safety plan
- ⦿ Rehearsed responses
- ⦿ Extraordinarily robust swim safety plan
- ⦿ Swim course design
- ⦿ Communications systems
- ⦿ Pre-race safety briefing
- ⦿ Warm-up
- ⦿ Sanction with USAT

Shared Responsibility: USAT

- ⦿ Distribute information
- ⦿ Education
 - Coaches
 - Race Directors
- ⦿ Best practice tools
- ⦿ Sanctioning processes
- ⦿ Ongoing review of fatalities, “near misses”
- ⦿ Info from other governing bodies, research
- ⦿ Annual reporting



What's Next?

USAT Ongoing Initiatives

⦿ Education

- Race Directors
 - Best Practices
 - Sharing Successes: 3 survivors of SCA in 2014
- Athletes
- Coaches
- Medical Professionals

⦿ Safety Planning

- Swim Safety Task Force

USAT Swim Safety Task Force

- ⦿ Temperature recommendations
- ⦿ Better post-event reporting
 - Water temperature
 - #'s: starters, DNF, rescue (reasons), fatalities
 - Shorten, cancel
- ⦿ Other safety considerations
 - Technical rules
 - Course design, marking
 - Race safety plan




Water Temperature Recommendations



USAT Recommendations for Multisport Age-Group Swim Segments

	Water Temperature (degree f)																																			
	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64-77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94			
Distance																																				
Less than 750 m																																				
750 - 1500 m																																				
Over 1500 m																																				
USAT Wetsuit Rules	Allowed<															No Awards										>Banned										

Legend:

		<u>Less than 750 m</u>	<u>750 - 1500 m</u>	<u>Over 1500 m</u>
	Neutral swim conditions	55° - 89° F 12.8° - 31.7° C	56° - 87° F 13.3° - 30.6° C	57° - 86° F 13.9° - 30° C
	Shorten swim	51° - 54°; 90° - 92° F 10.6° - 12.2°; 32.2° - 33.3° C	52° - 55°; 88° - 90° F 11/1° - 12.8°; 31.1° - 32.2° C	53° - 56°; 87° - 88° F 11.7° - 13.3° C; 30.6° - 31.1° C
	Cancel swim	Below 51°; Above 92° F < 10.6°; > 33.3° C	Below 52°; Above 90° F < 11.1°; > 32.2° C	Below 53°; Above 88° F < 11.7°; > 31.1° C

Note:

- 1) These are recommendations to race management, local officials, and athletes.
- 2) Keep in mind, other factors will influence safety conditions including air temperature, humidity, acclimation, regional adaptation, and wind.
- 3) Water temperature measurement will conform to USAT methodology in the *USAT Competitive Rules*
- 4) USAT does not have a rule requiring mandatory use of a wetsuit, however, RD's may establish that rule.

Next Steps in Research

- ◎ Harris, et al. partnering with USAT
 - Additional investigation of victims
 - Athletic history
 - Medical history
 - Resuscitation, treatment
 - Autopsy
 - **Questions:**
 - *Are the deaths related to athletic history?*
 - *How healthy were the victims?*
 - *What were the anatomic contributors?*
 - *Were there any “unusual” causes of death?*

Cause(s) of the Swim Deaths

- ◎ One potential theory for SCD:
 - Susceptible heart, athlete
 - Structural heart problems
 - Specific triggering event. *Autonomic conflict?*
 - Sudden increase in both sympathetic and parasympathetic nervous system
 - ↑S: exertion, cold water, anxiety
 - ↑P: facial wetting, water in mouth/pharynx, breath holding

International Olympic Committee

- >90% of SCD in athletes is due to pre-existing heart conditions
- “A pre-participation medical test is recommended for high level athletes. It should be performed under the responsibility of a specially trained physician.”



- **World Rowing**
 - Physical exam, EKG to compete in world championships
 - Elites, 2014
 - Age groupers, 2015

International Triathlon Union (ITU)

Current Recommendation

- “ITU encourages athletes to perform periodic health evaluation (PHE) and to undergo a pre-participation evaluation (PPE) prior to engaging in competitive sport.”

International Triathlon Union (ITU)

Future Initiatives

- Endorse IOC Lausanne recommendations
- For junior, U23, elite:
 - Medical questionnaire
 - Physical exam
 - ECG (every 2 years)
- International registry of SCD incidents



Laurent Vidal, 1984-2015

Summary

- Triathlon fatalities are rare
- Most occur during the swim portion
- Traumatic and non-traumatic causes
- Cardiac arrest predominates among non-traumatic causes
- Question:
 - Can we prevent/reduce number of fatalities?
- Shared responsibility for race safety



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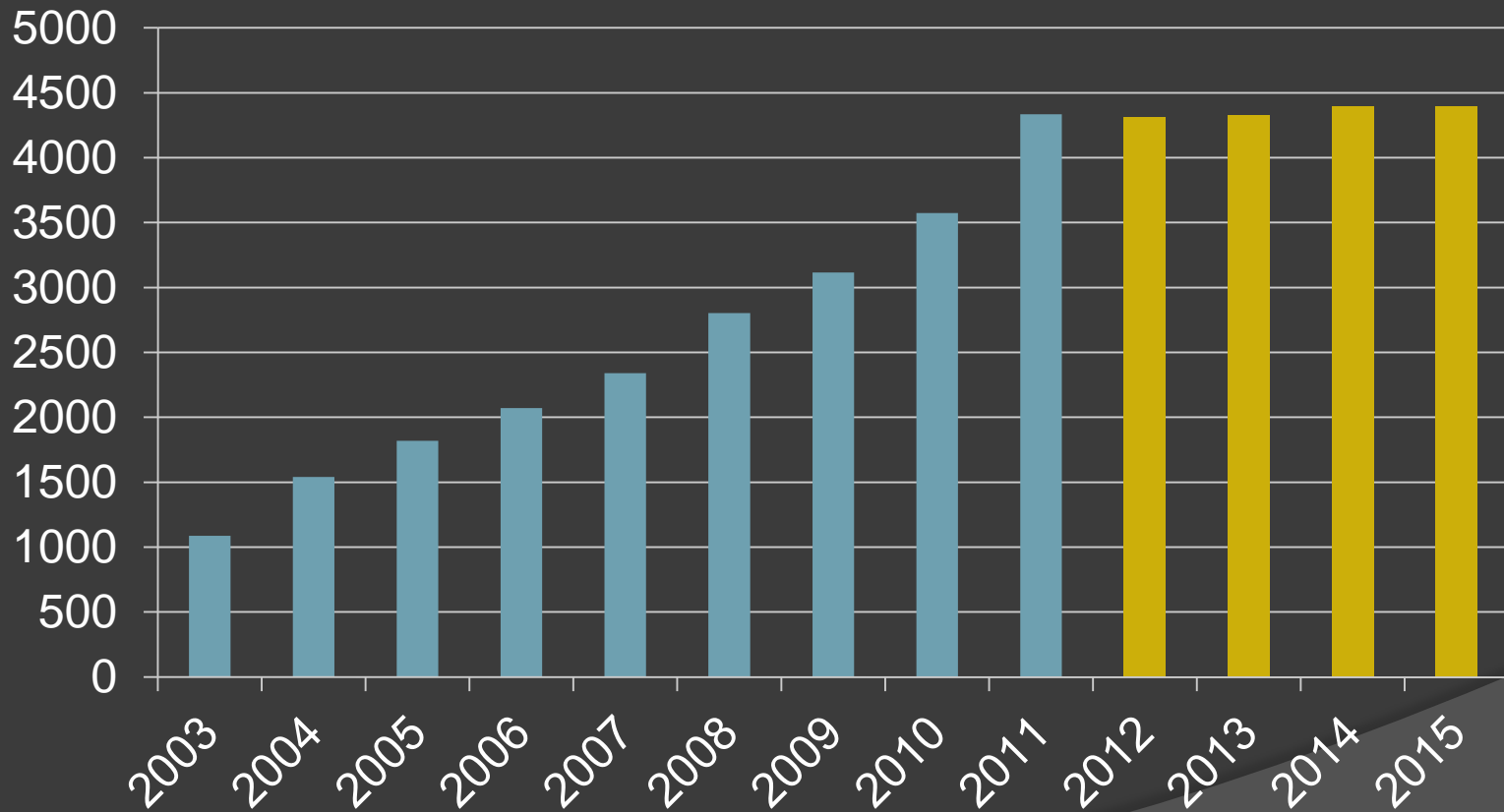
USAT 2015 Update

USAT 2015 Update

- ◎ Fatality Incidents Study, Fall 2012
 - 2003-2011
- ◎ What's happened since 2011?
 - Update through 2015 season

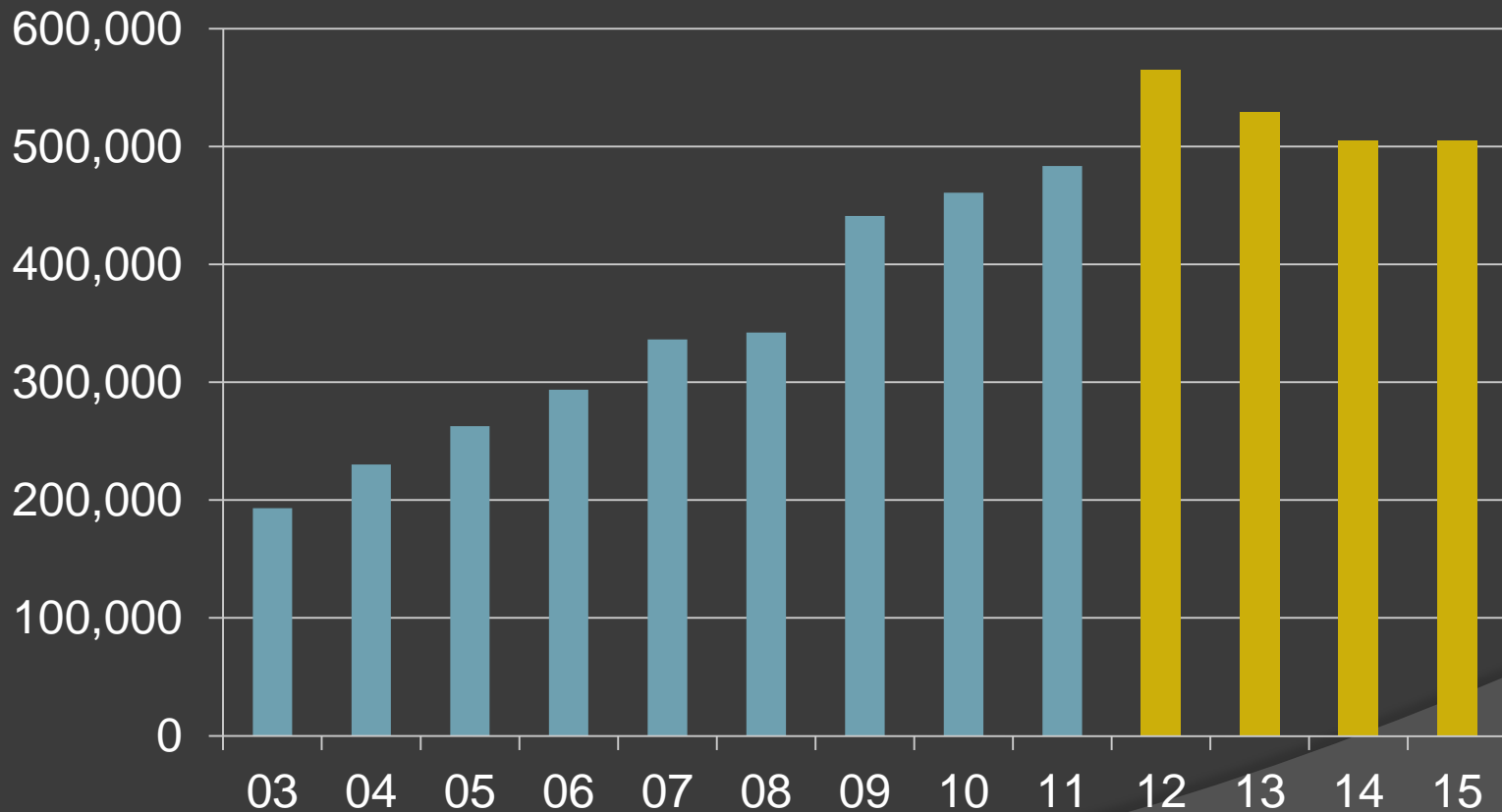
USAT 2015 Update: Participation




















































































USAT-Sanctioned Events



USAT 2015 Update: Participation

Adult Participants

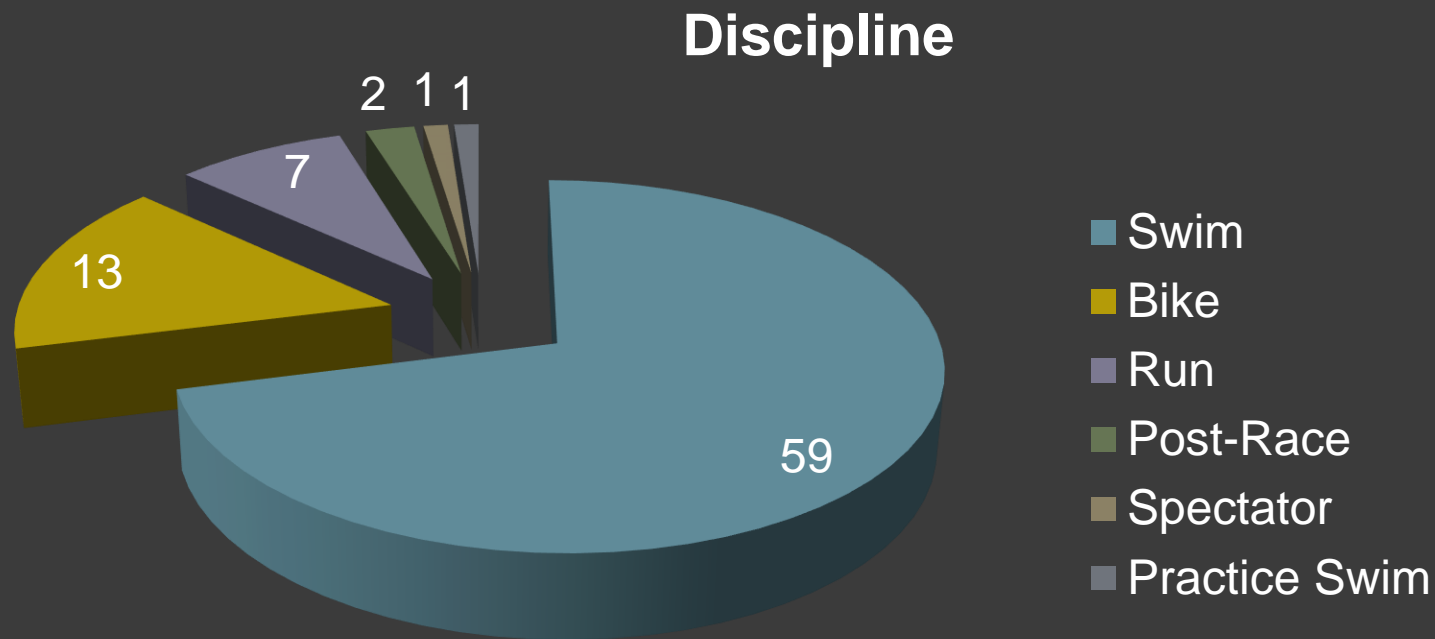


Year	Fatalities	Type of Fatalities
2003	1	 
2004	2	 
2005	7	      
2006	3	  
2007	6	     
2008	8	       
2009	3	  
2010	3	  
2011	12	           
2012	14	             
2013	9	        
2014	7	      
2015	7	      
Total	82	

USAT 2015 Update: Fatality Rates

Year	Approximate Fatality Rate
2003	N/A*
2004	N/A*
2005	N/A*
2006	1 per 98,000
2007	1 per 56,000
2008	1 per 43,000
2009	1 per 147,000
2010	1 per 153,000
2011	1 per 40,000
2012	1 per 40,000
2013	1 per 58,000
2014	1 per 72,000
2015*	1 per 72,000*
Average 2006-2015	1 per 63,000

USAT 2015 Update: Fatalities by Discipline



2003 - 2015

Cause(s) of the Swim Deaths

⦿ Possibilities:

- Sudden cardiac death (primary arrhythmia)
- Typical drowning
- Trauma
- Medical problem
 - Acute MI
 - Seizure
 - Syncope
 - Swimming-induced pulmonary edema (SIPE)
 - Pulmonary embolism
 - Stroke
 - Anaphylaxis
 - Hyperthermia
 - Panic